DENSO

Container Refrigerator Service Manual

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DENSO CORPORATION

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Circuit diagram / Wiring diagram (A4)

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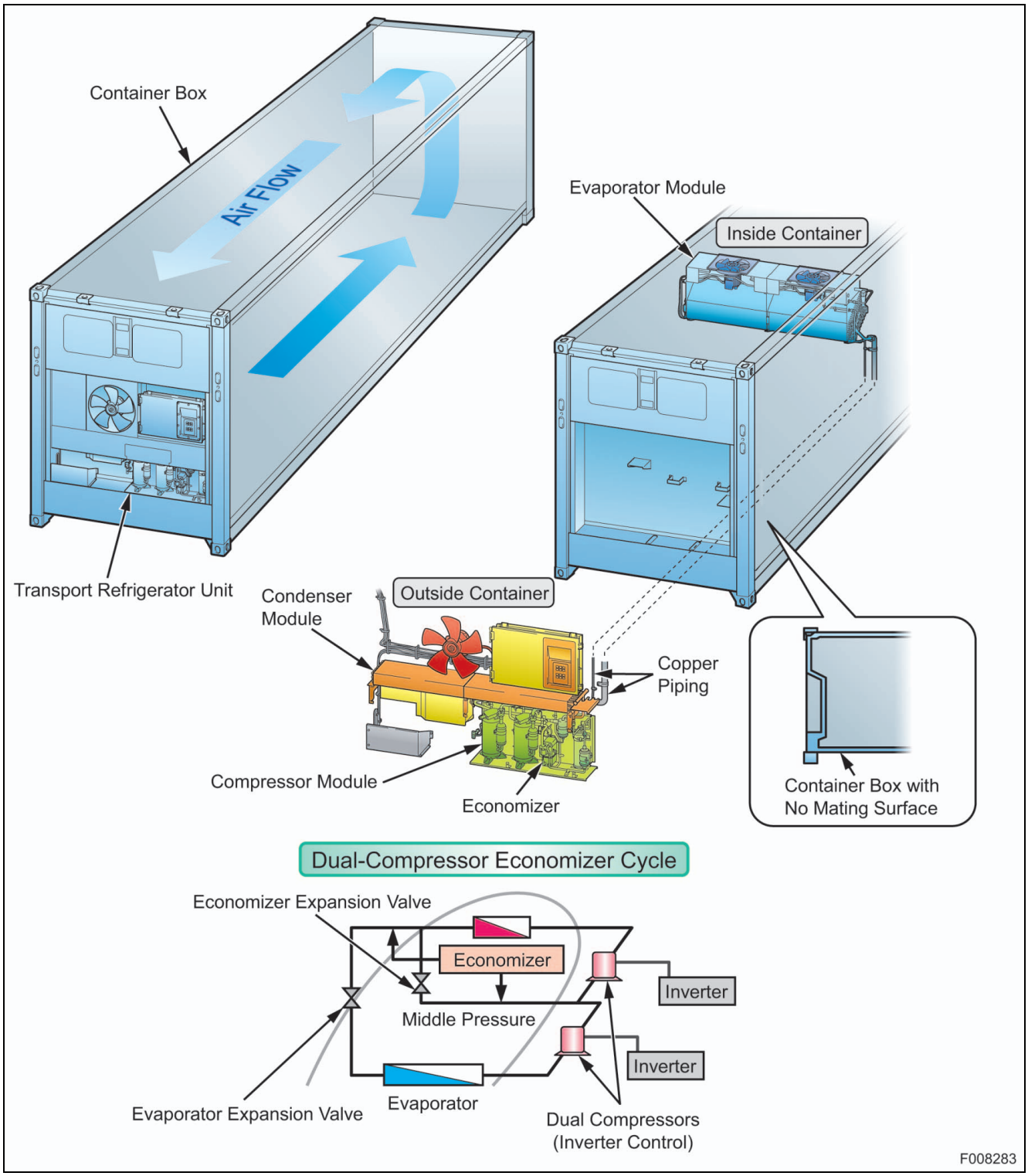
1. Features

1.1 Product Features

The DENSO sea container transport refrigerator uses an economizer cycle equipped with two compressors. In an economizer cycle, a portion of the high-pressure refrigerant from the compressor is expanded by the economizer expansion valve, and then supercooled by an economizer to improve refrigeration capacity.

- In the economizer cycle, compressor rotational speed is controlled by an inverter. Inverter control enables more accurate temperature regulation in relation to fluctuations in both ambient temperature and container-internal temperatures, thereby reducing power consumption. In addition, using two compressors lowers the compressor compression ratio, thereby decreasing compressor motive power.
- The sea container transport refrigerator is specially constructed for mounting to the container box. Since container boxes have no mating surface, insulation performance is improved.


Container Box
Air Flow
Transport Refrigerator Unit
Evaporator Module
Inside Container
Outside Container
Condenser Module
Copper Piping
Compressor Module
Economizer
Container Box with No Mating Surface
Dual-Compressor Economizer Cycle
Economizer Expansion Valve
Economizer
Inverter
Middle Pressure
Inverter
Evaporator Expansion Valve
Evaporator
Dual Compressors (Inverter Control)
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2. Product Liability (PL) Information

2.1 Precautions for Refrigerator Use

- The following signal word explanations contain important information to prevent harm and material losses to personnel, and to promote safe and correct usage of the sea container transport refrigerator. Familiarize yourself with the following items, and follow the relevant content as necessary throughout this manual.

Symbol	Meaning
⚠DANGER	**Indicates a high possibility that "improper handling by the user may result in death or serious injury*1".**
⚠WARNING	**Indicates a possibility that "improper handling by the user may result in death or serious injury*1".**
⚠CAUTION	**Indicates a possibility that "improper handling by the user may result in injury*2 and/or material loss*3".**

*1 : *Serious injury is defined herein as those injuries such as vision loss, burns (high temperature, low temperature), electric shock, broken bones, and poisoning. The subsequent effects and treatment of the aforementioned injuries require hospitalization and/or long-term outpatient hospital visitation.
*2 : *2 Injury is defined herein as wounds, burns, electric shock, etc. whose subsequent treatment does not require hospitalization or long-term outpatient hospital visitation.
*3 : Material loss is defined herein as extensive losses in regards to residence, household articles, live-stock, pets, etc. Material loss also includes damage that impacts the environment.

⚠DANGER
Always turn the transport refrigerator power switch OFF before removing the power plug. **• Failure to do so may lead to electrical shock.**
Always open the transport refrigerator circuit breaker when inspecting the control box. **• Failure to do so may lead to electric shock from the high voltage applied to the circuit breaker, even if the transport refrigerator power supply switch (operation switch) is OFF.**
Never touch power plugs or electrical components with wet hands. **• Doing so may lead to electrical shock.**
Provide sufficient ventilation when working inside the compartment. **• Failure to provide sufficient ventilation may lead to serious accidents.**
Do not store volatile or inflammable items in either compartment. **• Doing so may lead to an explosion and/or fire.**
Do not approach the transport refrigerator with an open flame. **• Leaving open fires in the work area may lead to serious accidents due to the production of toxic gases arising from refrigerant contacting the flame.**
When operating the transport refrigerator, verify that there are no personnel in the container. **• Leaving personnel inside the container may lead to death from exposure to the cold.**
Do not touch any portion of the transport refrigerator other than the control panel during operation. **• Doing so may lead to injuries due to the rotating condenser and cooling fans, or injuries from other components such as the compressor.**

⚠ DANGER

Do not place any objects or your hand over the air intakes or air outlets.

- **Doing so may lead to injury due to fan rotation.**

⚠ WARNING

Install a ground fault breaker on the power supply side of the system.

- **Failure to do so may lead to electrical shock.**

Always perform grounding work on the power supply side of the system.

- **Unstable grounding may lead to electrical shock.**

In the event of a transport refrigerator abnormality, immediately stop the refrigerator, and contact a specialist for inspections and repair.

- **Continuing to operate the transport refrigerator under abnormal conditions may lead to fires.**

Do not allow anyone other than a specialist disassemble or repair the transport refrigerator.

- **Incorrect disassembly or repairs may lead to injuries due to incorrect operation, as well as electrical shock and fires.**

Always stop the transport refrigerator by turning the power supply switch OFF prior to cleaning, maintenance, and inspections. In addition, open the circuit breaker, and remove the power plug.

- **Failure to do so may lead electrical shock or injury from rotating parts.**

Never grasp the cord to remove the power plug.

- **Pulling on the cord may lead to heat generation and/or sparking due to a portion of the wire core being open circuited.**

When connecting the power plug, verify that there is no dust adhering to the plug, and then firmly insert the plug into the outlet.

- **Using a dusty plug, or a plug that is not firmly connected may lead to electrical shock and/or fire.**

Do not connect the power cord during transport refrigerator operation. In addition, do not use an extension cord.

- **Doing so may lead to electrical shock, heat generation, and/or fires.**

Beware of the following when handling the power cord.

- **Do not excessively bend, pull, or twist the power cord.**
- **Do not place heavy items on the power cord.**
- **Do not run the power cord between objects.**

Doing so may lead to electrical shock, heat generation, and/or fires.

Do not get water on any electrical systems such as the electrical box module, etc.

- **Doing so may lead to short circuits, electrical shock, and/or fires.**

Use caution, as there are cases in which the evaporator and condenser fan start to operate without warning while the transport refrigerator is running.

- **Failure to use caution during transport refrigerator operation may lead to injury.**

⚠ CAUTION
Periodically check to ensure that power supply side outlets are not damaged. **• Using a damaged power outlet may lead to short circuits, electrical shock and/or fires.**
Never use any refrigerant other than R404A with the transport refrigerator. **• Charging with other than the specified refrigerant may lead to transport refrigerator damage.**
Use ether oil as the lubricating oil for the transport refrigerator. **• Using other than the specified lubricating oil may lead to transport refrigerator damage.**
Securely close the electrical box module lid. **• Failure to securely close the lid so may lead to short circuits, electrical shock and/or fires due to water intrusion.**
Remove the electrical box module wire, wiring harnesses, and connector prior to arc welding any portion of the container.

3. Product Outline

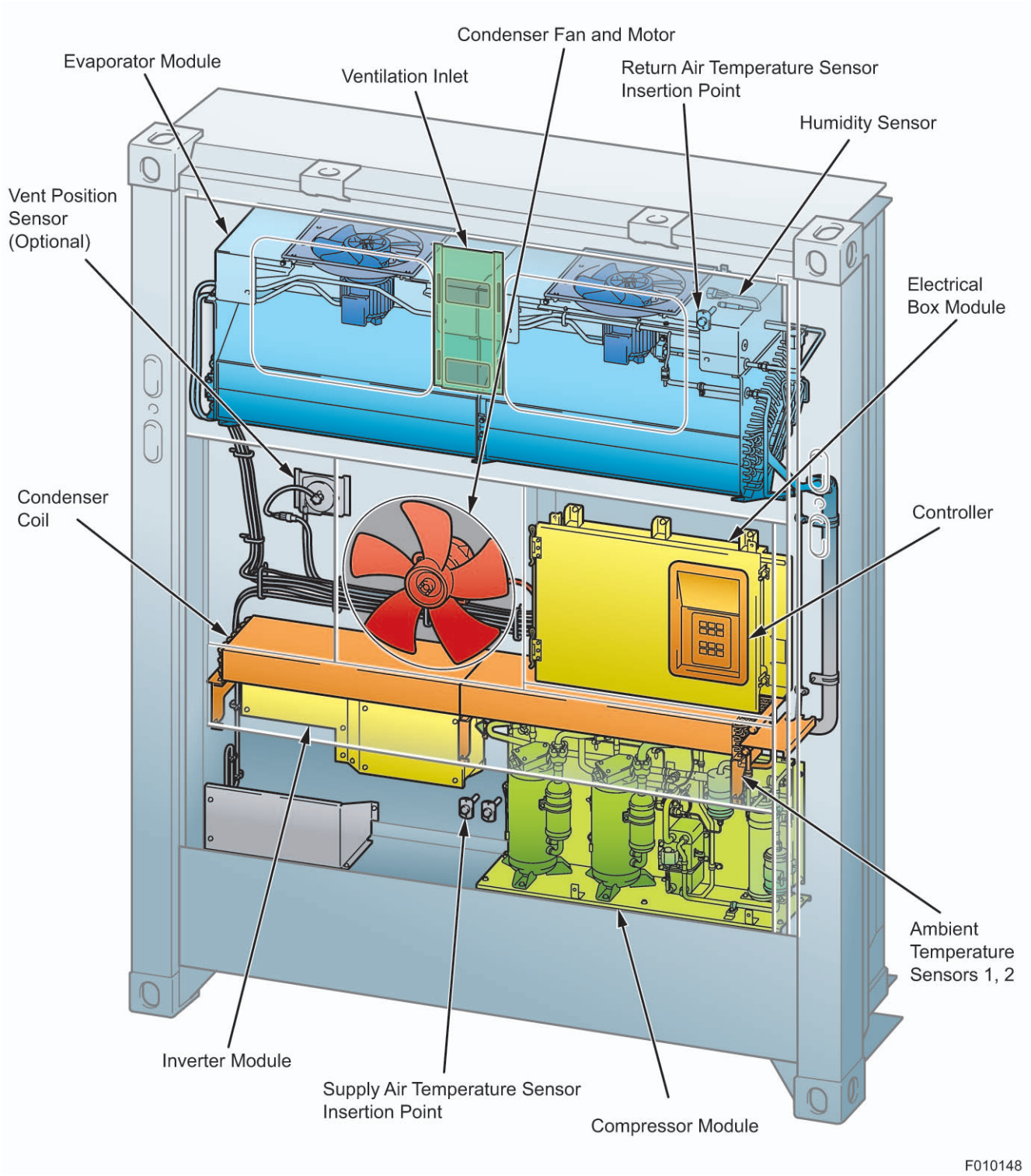
3.1 Primary Specifications

Item			Specification
Container Internal Temperature Adjustment Range			-35°C ~ 30°C (-31°F ~ 86°F)
Product Specifications	Power Supply		Use three-phase 440 VAC x 60 Hz as the standard; however, 380/415 VAC x 50 Hz is also possible.
	Condenser Cooling Method		Air-cooled type
	Controller		Electronic controller
	Compressor		Completely enclosed rotary type x 2
	Evaporator		Plate-fin type
	Condenser		Plate-fin type
	Cooling Fan		Propeller fan
	Cooling Fan Motor		Three-phase AC motor
	Condenser Fan		Propeller fan
	Condenser Fan Motor		Three-phase AC motor
	Defrost	Defrost Method	Electric heater
		Defrost Command	Automatic/manual
		Defrost Completion	When the defrost completion temperature is detected, or the defrost operating time
	Refrigerant Control		Electronic expansion valve
	Temperature Control Method		Compressor rotational speed control
	Protective/Safety Systems		High-pressure switch, relief valve, thermal switch (motor, heater), fuses (control circuit: 8 A, 10 A)
	Refrigerant		R404A (quantity: 6.3 kg)
	Transport Refrigerator Lubrication		Ether oil
	Weight		270 kg

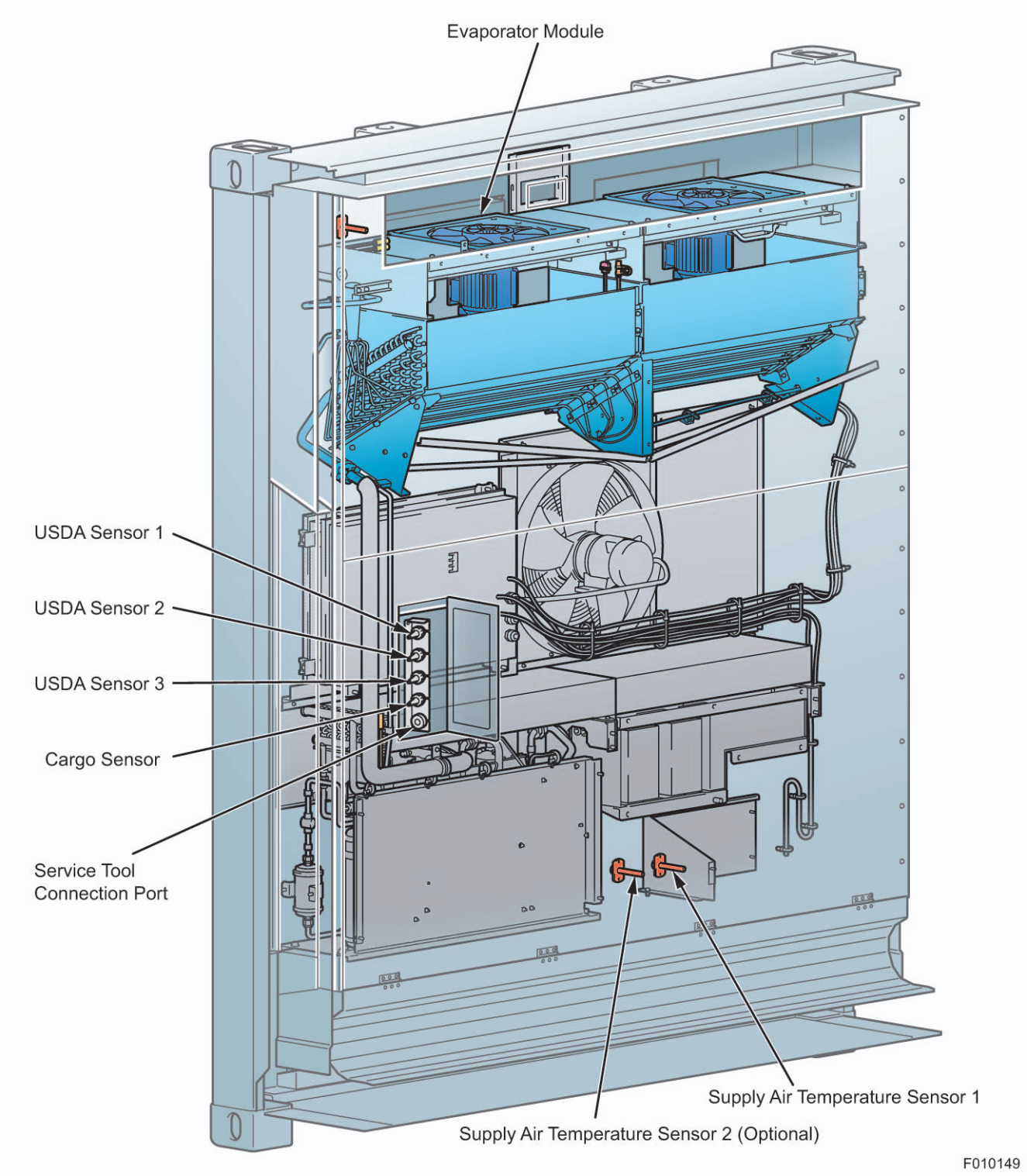
3.2 Construction and Part Names

(1) Overview

- Container Front Wall (Viewed from Container Exterior)

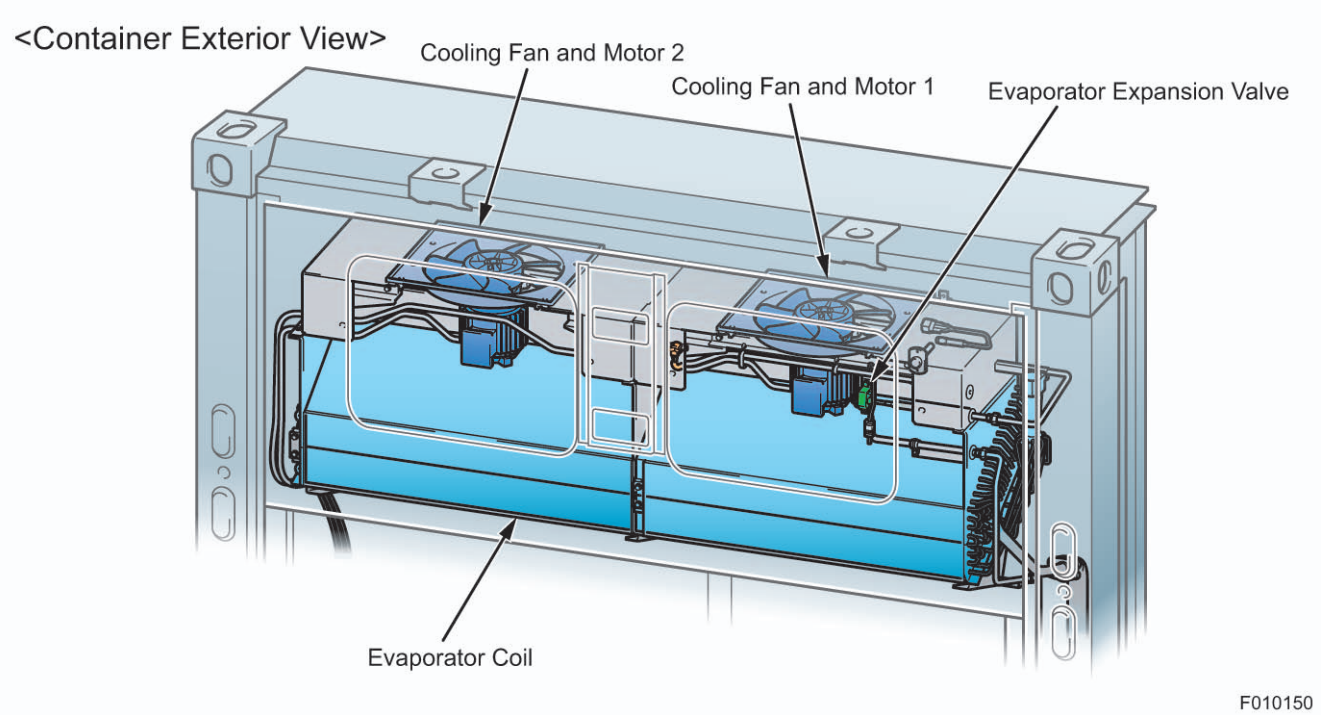


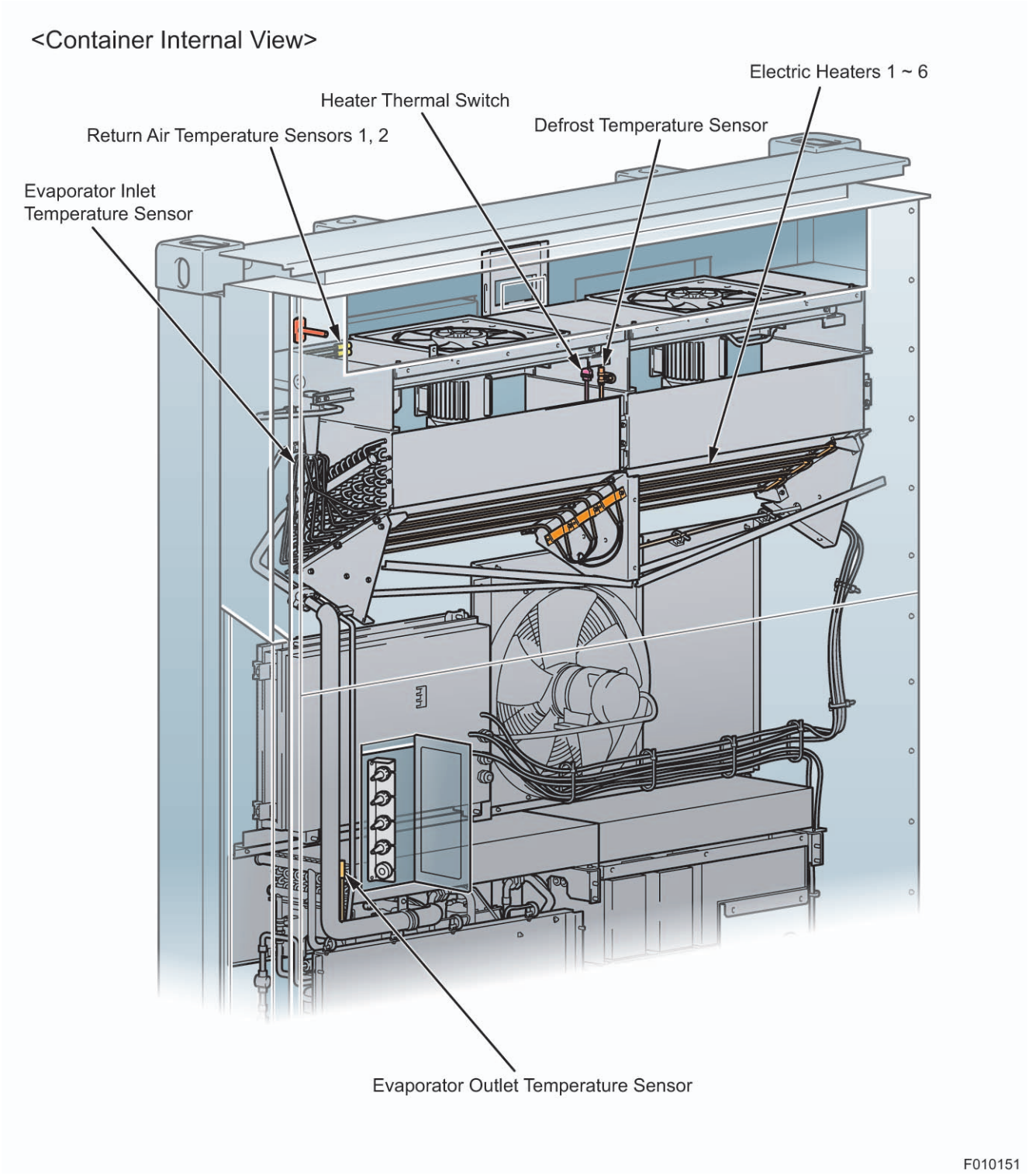
- Container Front Wall (Viewed from Container Interior)



3.3 Configuration of Each Unit

(1) Evaporator Module




<Container Internal View>
Electric Heaters 1 ~ 6
Heater Thermal Switch
Defrost Temperature Sensor
Return Air Temperature Sensors 1, 2
Evaporator Inlet
Temperature Sensor
Evaporator Outlet Temperature Sensor
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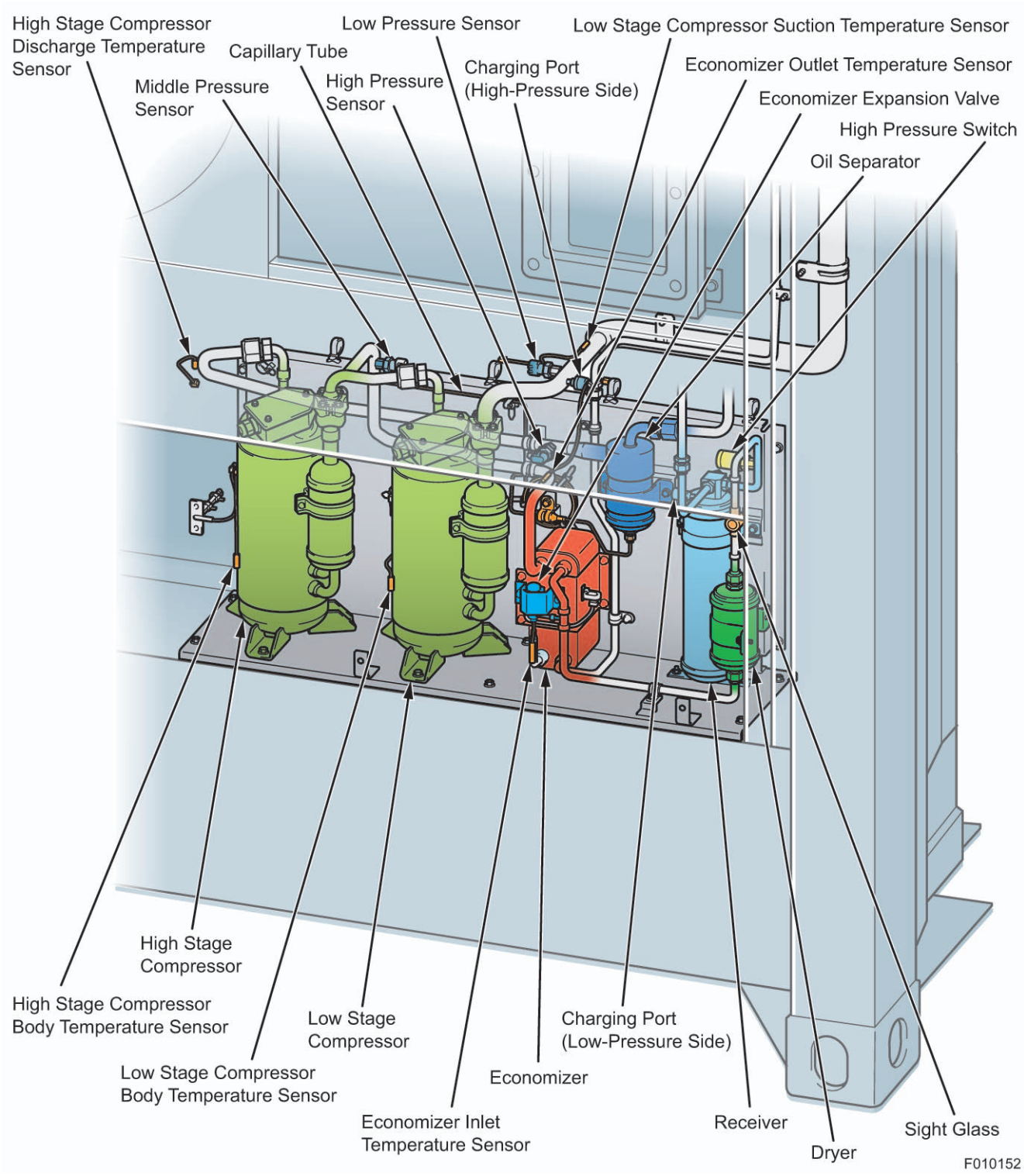
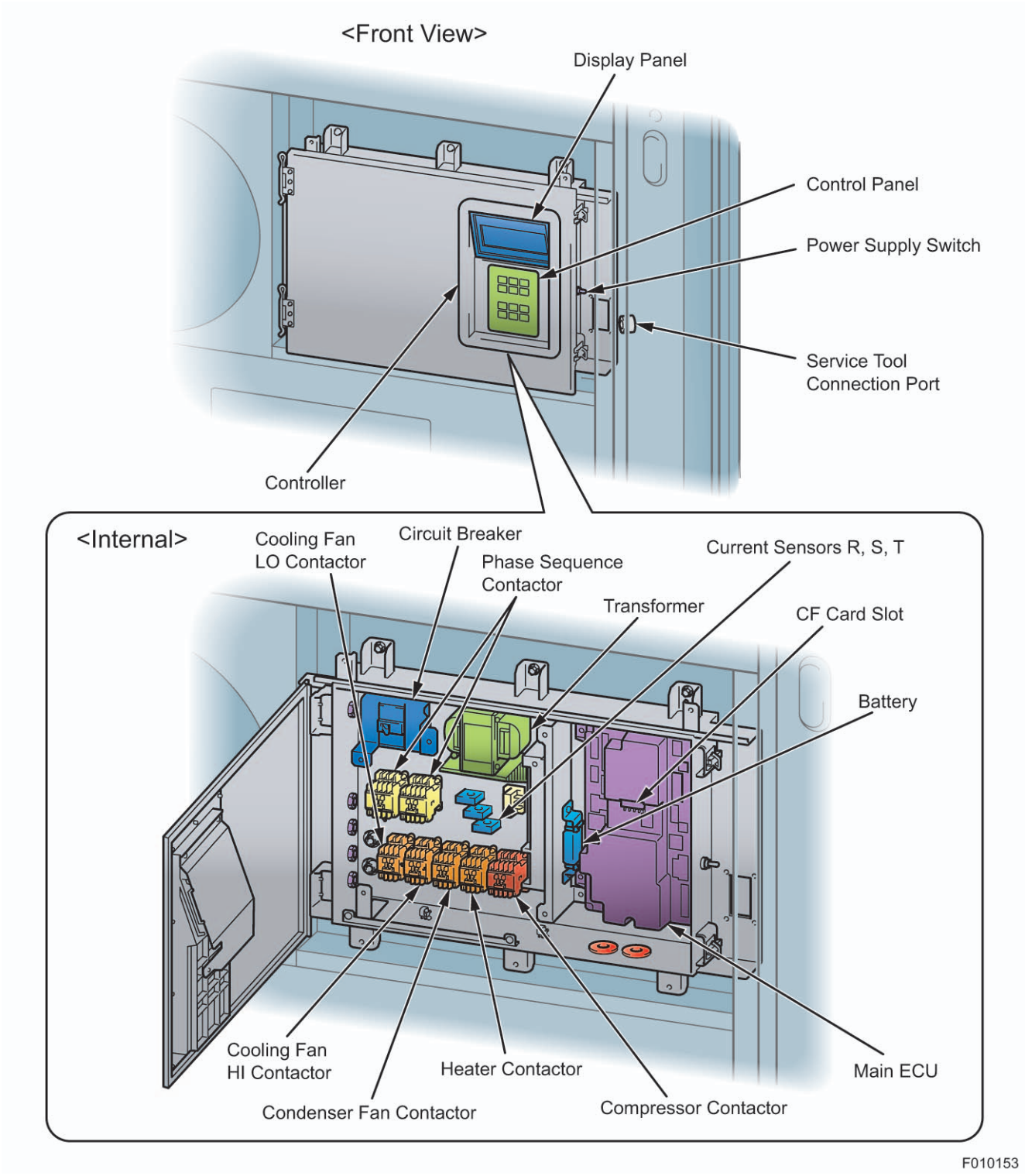
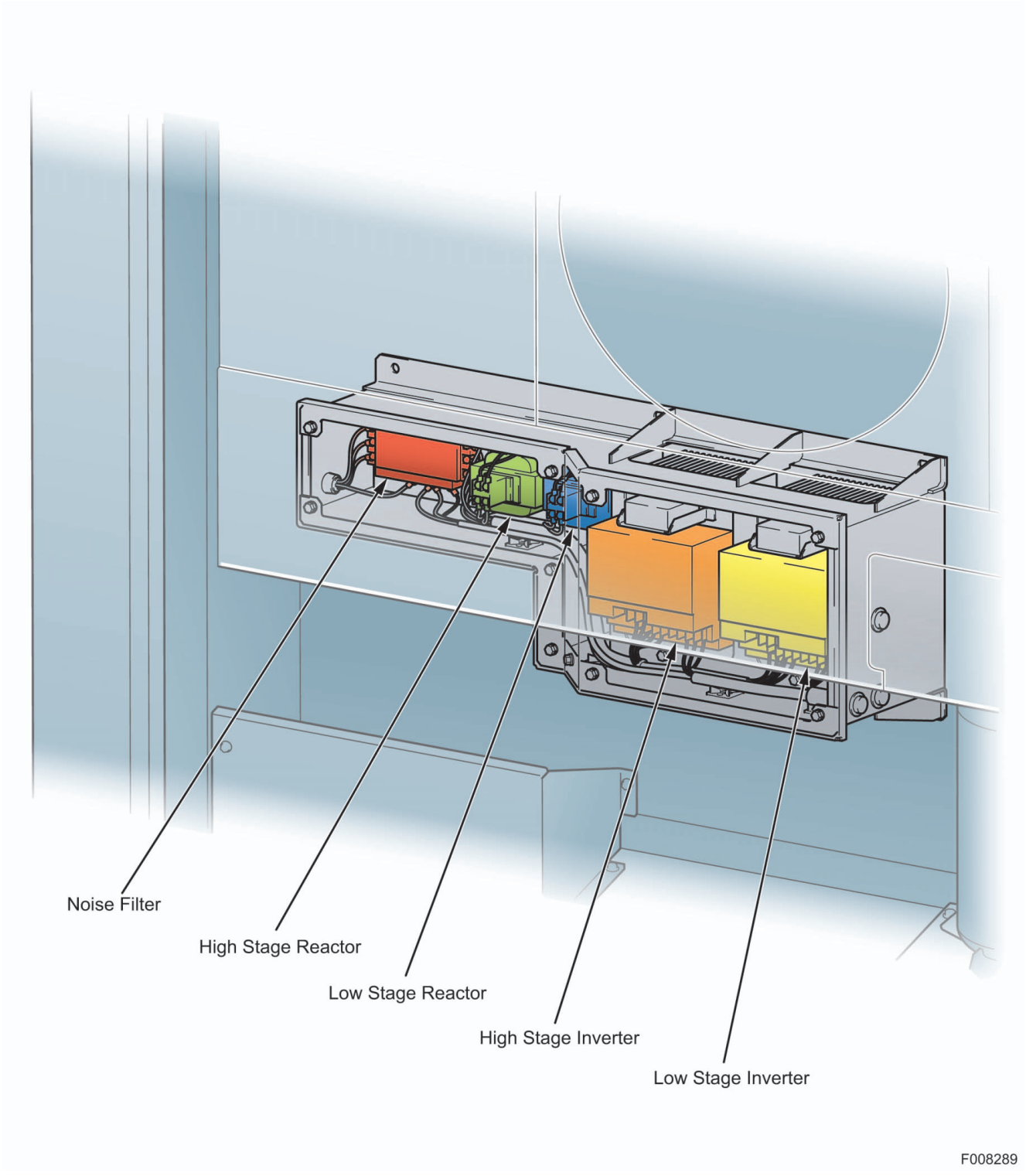
(2) Compressor Module



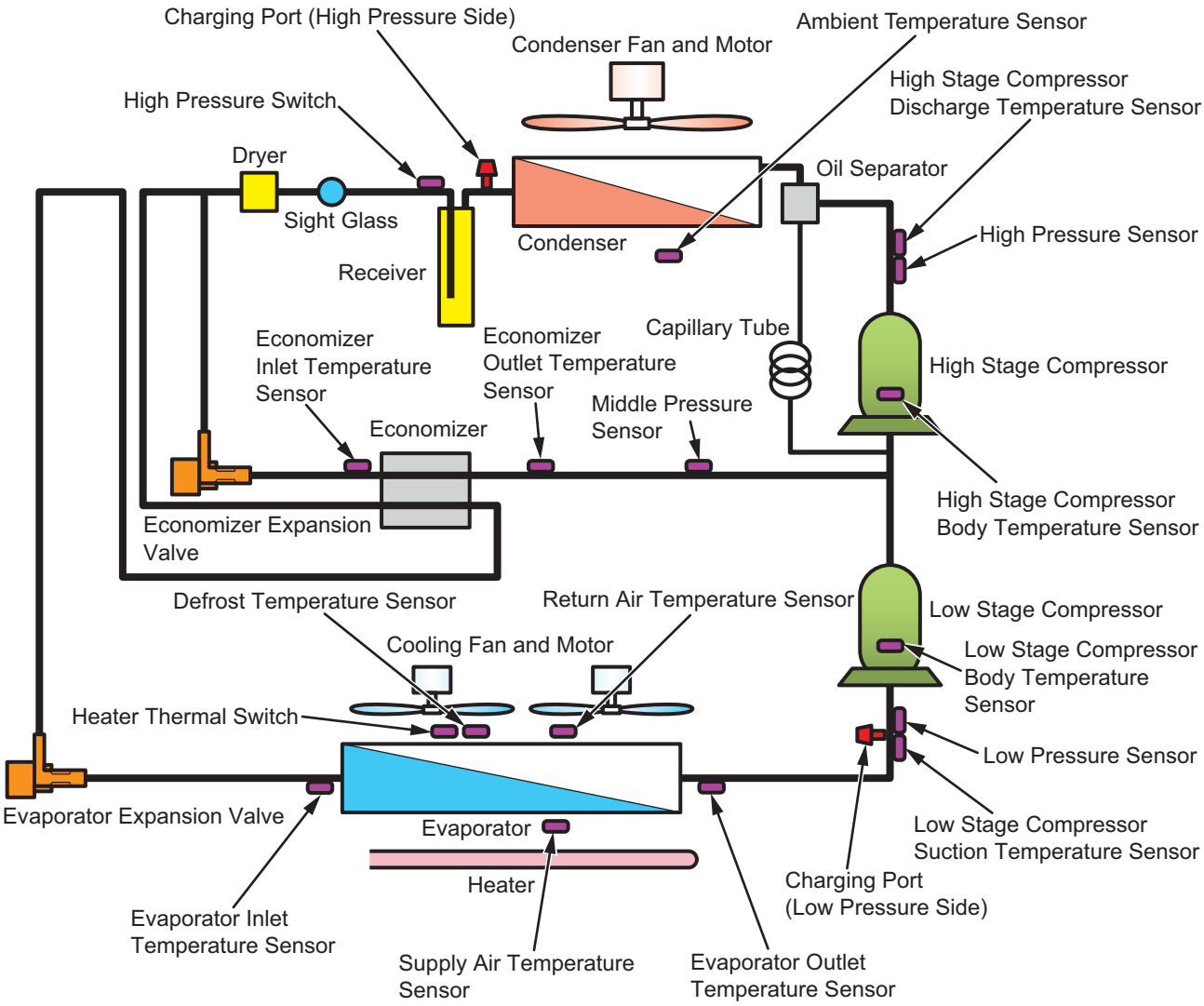
(3) Electrical Box Module



(4) Inverter Module



3.4 Refrigeration Cycle



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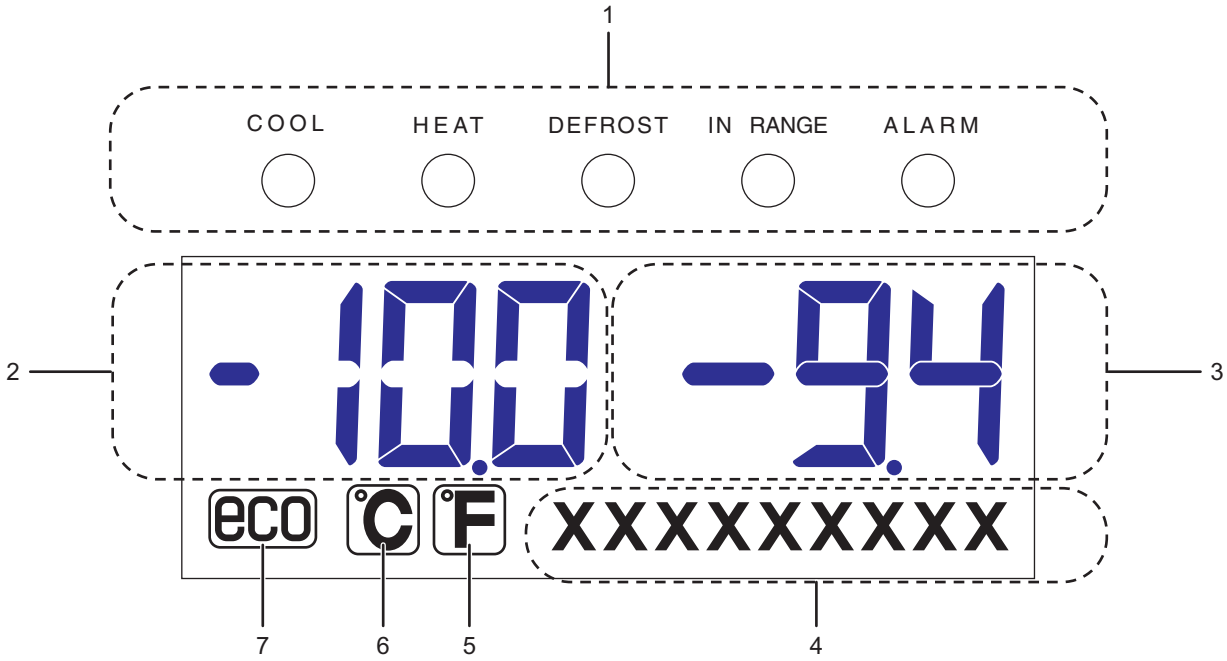
4. Explanation of Operation

4.1 Display Part Names



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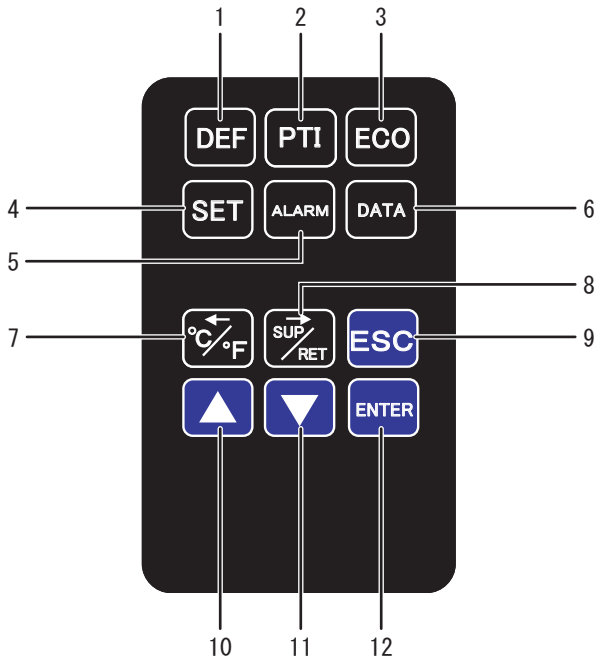
No.	Name		Display Content
1	LED Display Light	COOL (Amber)	Lit during cooling operation.
		HEAT (Amber)	Lit during heater operation.
		DEFROST (Amber)	Lit during defrost operations.
		IN RANGE (Green)	Lit when the container-internal temperature is being controlled to the set temperature.
		ALARM (Red)	Lit or flashing when there is a system abnormality.
2	Set Value Display		• Normally displays the set temperature. • When performing settings, displays the setting code.
3	Measured Value Display		• Normally displays the container-internal temperature. (During chilled operation, displays the supply air temperature. During frozen operation, displays the return air temperature.) • Shows the measured value for each item when the operational status is displayed. • Shows the alarm code when an alarm is being displayed.
4	Sub-Display		• Normally indicates whether the measured value display is showing the supply air temperature (SUPPLY) or the return air temperature (RETURN). • Displays the alarm case number when an alarm occurs. • Displays information relevant to each setting and operation being performed.

No.	Name	Display Content
5	Fahrenheit Display	Lit when the temperature is set to display in the Fahrenheit scale.
6	Celsius Display	Lit when the temperature is set to display in the Celsius scale.
7	ECO Display	Lit when eco-mode operation is set.

4.2 Operation Switch Names



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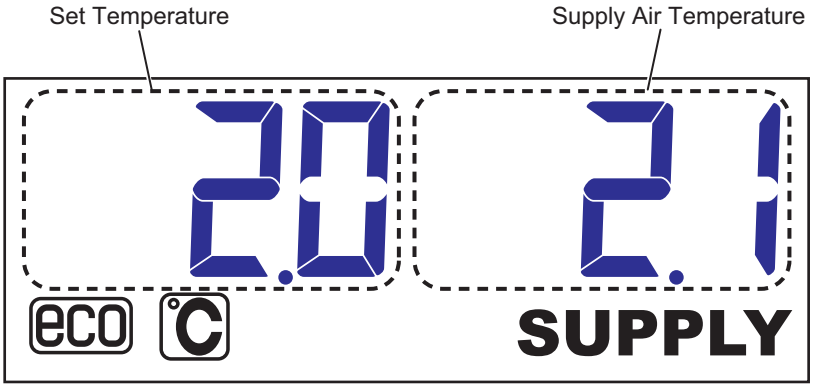
No.	Operation Switch Name	Function
1	DEF Switch	• Displays the defrost temperature during defrost operation. • Manually start defrost operation.
2	PTI Switch	• Starts PTI operation (checks for any system abnormalities). • Starts individual component operation (checks for any individual component abnormalities).
3	ECO Switch	Starts eco-mode operation.
4	SET Switch	Enters the set mode for each setting operation.
5	ALARM Switch	• Displays the alarm code and the alarm case number. • Clears the alarm.
6	DATA Switch	Display operational information such as system pressure and temperature.
7	°C/°F Switch	Switches the temperature display between Celsius and Fahrenheit (while the switch is depressed).
8	SUP/RET Switch	Switches the temperature display between the supply air temperature and the return air temperature (while the switch is depressed).
9	ESC Switch	Returns the display for each mode to the first level.
10	▲ Switch	Switches between display codes and data set values (up).
11	▼ Switch	Switches between display codes and data set values (down).
12	ENTER Switch	Determines the operations for each mode.

4.3 Normal Display Screen

- When the set temperature is -10°C or higher.



* The display switches from the supply air temperature (SUPPLY) to the return air temperature (RETURN) while the SUP/RET switch is being pressed.
* The display switches from Celsius (°C) to Fahrenheit (°F) while the °C/°F switch is being pressed.
* "ECO" is illuminated during eco-mode.

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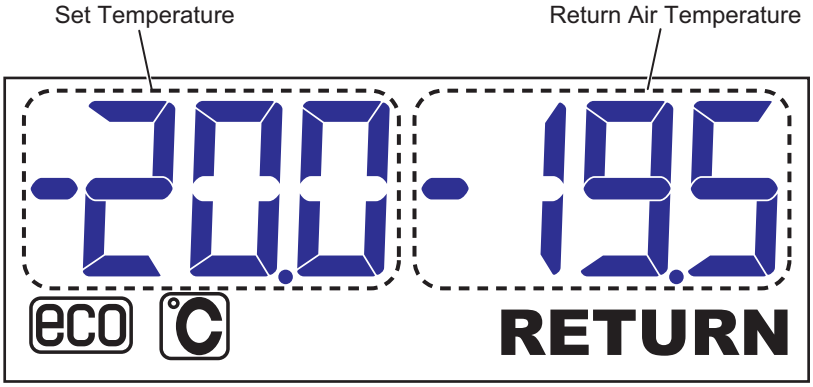
- When the set temperature is -10.1°C or lower.



* The display switches from the return air temperature (RETURN) to the supply air temperature (SUPPLY) while the SUP/RET switch is being pressed.
* The display switches from Celsius (°C) to Fahrenheit (°F) while the °C/°F switch is being pressed.
* "ECO" is illuminated during eco-mode.

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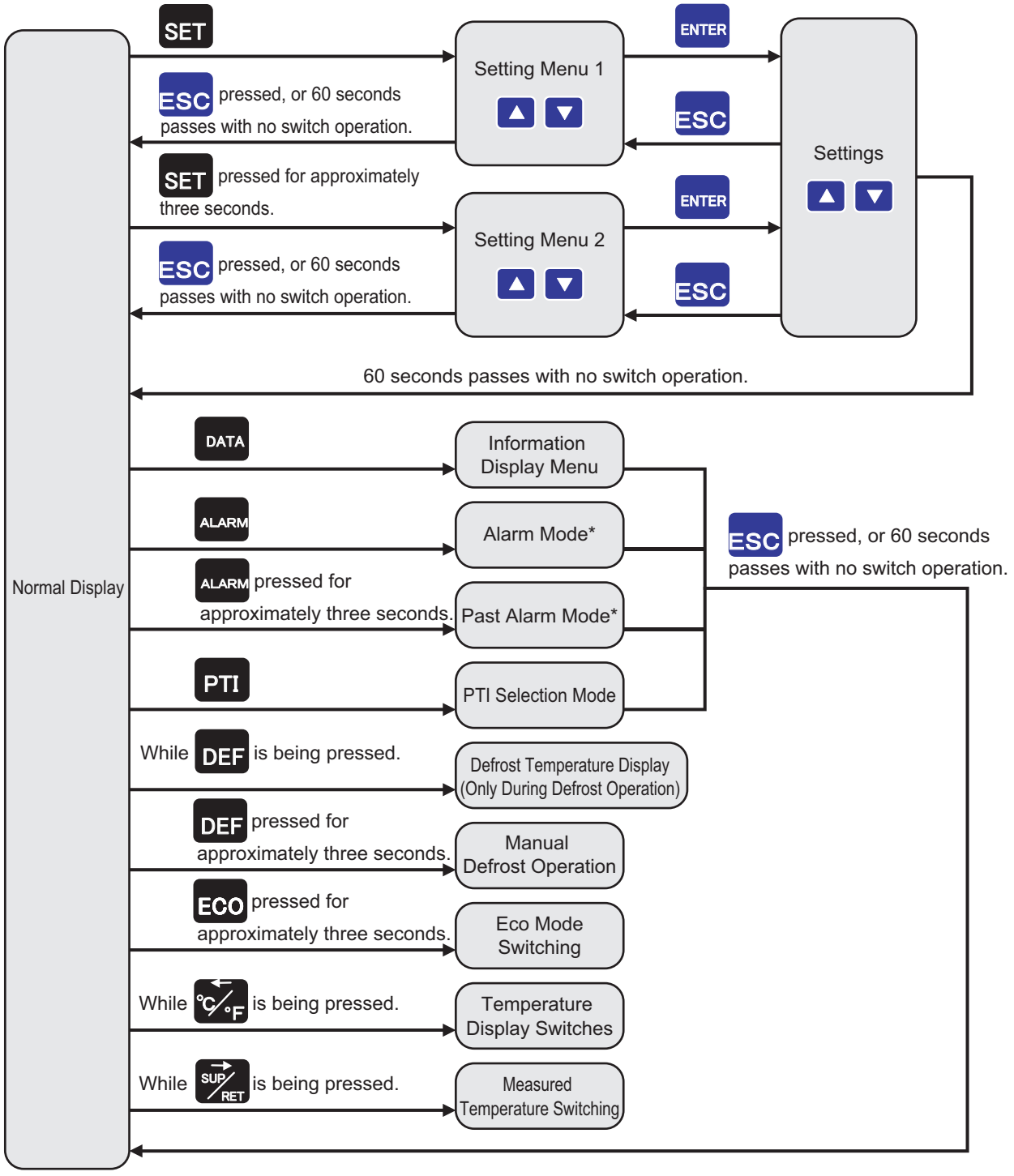
4.4 Operation Menu Transitions



*For the operation method, refer to "Alarm Code Display and Operation During an Abnormality."

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4.5 List of Items for Setting Menu 1

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
1	Set temperature change	S01	-	STCHG	P1-23
2	Switching between Celsius and Fahrenheit	S02	-	C/FCHG	P1-23
3	Defrost interval change	S03	-	dEFTCHG	P1-24
4	Sensor logging interval change	S05	-	LOGICHG	P1-24
5	Dehumidification operation	S06	-	dEHCHG	P1-25
6	Set humidity change	S07	-	SHCHG	P1-25
7	Defrost completion temperature change	S08	-	dEFTTCHG	P1-26
8	Current limit	S09	-	AMPLCHG	P1-26
9	Battery check	S10	-	bATCHK	P1-27

4.6 List of Items for Setting Menu 2

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
1	Container ID code	S11	-	CNTNCHG	P1-28
2	Time	S12	-	TIME	P1-29
3	Date	S13	-	dATE	P1-30
4	Supply air temperature sensor 2 configuration	S14	-	SUP2CHG	P1-31
5	Return air temperature sensor 2 configuration	S15	-	RET2CHG	P1-31
6	Ambient temperature sensor 2 configuration	S16	-	AMb2CHG	P1-32
7	USDA sensor configuration	S17	-	USdACHG	P1-32
8	Humidity sensor configuration	S18	-	HUMSCHG	P1-33
9	Door opening sensor configuration	S19	-	VPSCHG	P1-33
10	High stage compressor operating time clear	S26	-	CLRHSCHR	P1-34
11	Low stage compressor operating time clear	S27	-	CLRLSCHR	P1-34
12	Cooling fan motor 1 (right side) operating time clear	S28	-	CLREFMRHR	P1-34
13	Cooling fan motor 2 (left side) operating time clear	S29	-	CLREFMLHR	P1-35
14	Condenser fan motor operating time clear	S30	-	CLRCFMHR	P1-35
15	Heater operating time clear	S31	-	CLRHTRHR	P1-35
16	High stage inverter operating time clear	S32	-	CLRHSIRHR	P1-36
17	Low stage inverter operating time clear	S33	-	CLRLSIRHR	P1-36
18	Transport refrigerator operation during a high-pressure abnormality	S37	-	HPANLCHG	P1-37
19	Transport refrigerator operation during a low-pressure abnormality	S38	-	LPAbNCHG	P1-37
20	LCD backlight ON/OFF	S42	-	bLOFF	P1-38
21	Trip start	S43	-	TRIPS	P1-38

4.7 List of Items for the Information Display Menu

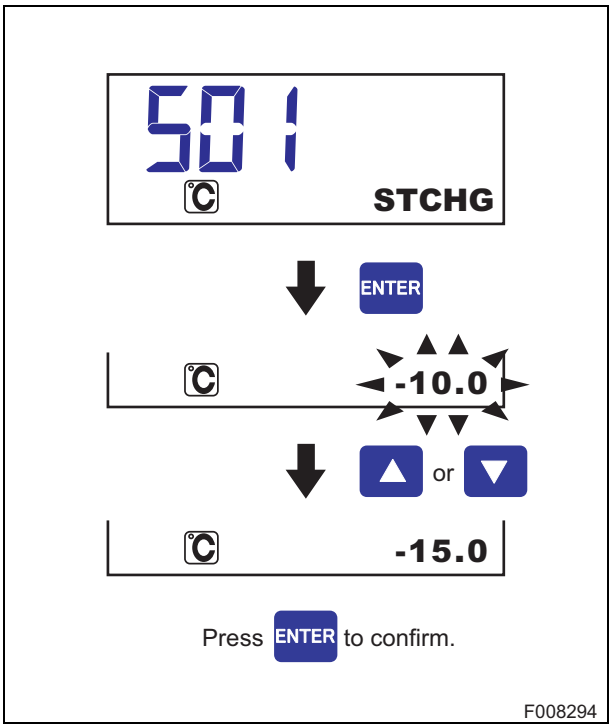
No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
1	Return air temperature 1	01	***.*	RET1	P1-39
2	Supply air temperature 1	02	***.*	SUP1	P1-39
3	Ambient temperature 1	03	***.*	AMb1	P1-39
4	USDA1 temperature	04	***.*	USdA1	P1-40
5	USDA2 temperature	05	***.*	USdA2	P1-40
6	USDA3 temperature	06	***.*	USdA3	P1-40
7	Cargo temperature	07	***.*	CARGO	P1-41
8	Relative humidity	08	***	RETRH	P1-41
9	Ventilation flow volume	09	***	VENT	P1-41
10	Return air temperature 2	10	***.*	RET2	P1-42
11	Supply air temperature 2	11	***.*	SUP2	P1-42
12	Ambient temperature 2	12	***.*	AMb2	P1-42
13	Defrost temperature	13	***.*	dEFT	P1-43
14	High stage compressor discharge temperature	14	***.*	HSCdT	P1-43
15	High stage compressor body temperature	16	***.*	HSCbT	P1-43
16	Low stage compressor suction temperature	18	***.*	LSCST	P1-44
17	Low stage compressor body temperature	19	***.*	LSCbT	P1-44
18	Evaporator inlet temperature	20	***.*	EI	P1-44
19	Evaporator outlet temperature	21	***.*	EO	P1-45
20	Economizer inlet temperature	22	***.*	ECI	P1-45
21	Economizer outlet temperature	23	***.*	ECO	P1-45
22	High pressure	24	-	HP ****	P1-46
23	Middle pressure	25	-	MP ****	P1-46
24	Low Pressure	26	-	LP ****	P1-46
25	High stage compressor current	27	**.*	HSCC	P1-47
26	Low stage compressor current	28	**.*	LSCC	P1-47
27	High stage inverter frequency display	29	***	HSIF	P1-47
28	Low stage inverter frequency display	30	***	LSIF	P1-48
29	High stage inverter temperature	31	***	HSIT	P1-48
30	Low stage inverter temperature	32	***	LSIT	P1-48
31	Evaporator expansion valve opening	33	***	EVA EXP	P1-49
32	Economizer expansion valve opening	34	***	ECO EXP	P1-49
33	Cooling fan status	35	***	EFM	P1-49
34	Main power supply voltage	37	***	VOL	P1-50

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
35	Main power supply U-phase current	38	**.*	L1	P1-50
36	Main power supply V-phase current	39	**.*	L2	P1-50
37	Main power supply W-phase current	40	**.*	L3	P1-51
38	Main power supply frequency	41	**	HZ	P1-51
39	High stage compressor operating time	42	-	HSCRHR	P1-51
40	Low stage compressor operating time	43	-	LSCRHR	P1-52
41	Cooling fan motor 1 (right side) operating time	44	-	EFMRRHR	P1-52
42	Cooling fan motor 2 (left side) operating time	45	-	EFMLRHR	P1-52
43	Condenser fan motor operating time	46	-	CFMRHR	P1-53
44	Heater operating time	47	-	HTRHR	P1-53
45	High stage inverter operating time	48	-	HSIRHR	P1-53
46	Low stage inverter operating time	49	-	LSIRHR	P1-54
47	Supply air temperature log data	50	-	SUP dATA	P1-54
48	Return air temperature log data	51	-	RET dATA	P1-55
49	Program version	52	-	PGM VER	P1-55

4.8 Operating Method for Setting Menu 1

(1) Set Temperature Change

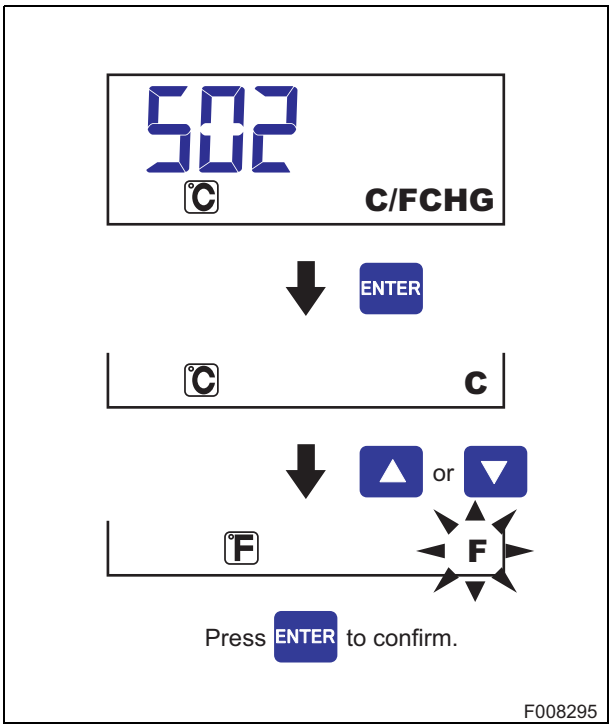
• Change the container-internal set temperature to the desired value.



1) Press SET to display "SO1".
2) Press ENTER to display the current set temperature.
3) Use the ▲ or ▼ switch to set the desired temperature.
   Press and hold either switch to cycle through the digits successively.
4) Press ENTER to confirm the setting.

(2) Switching Between Celsius and Fahrenheit

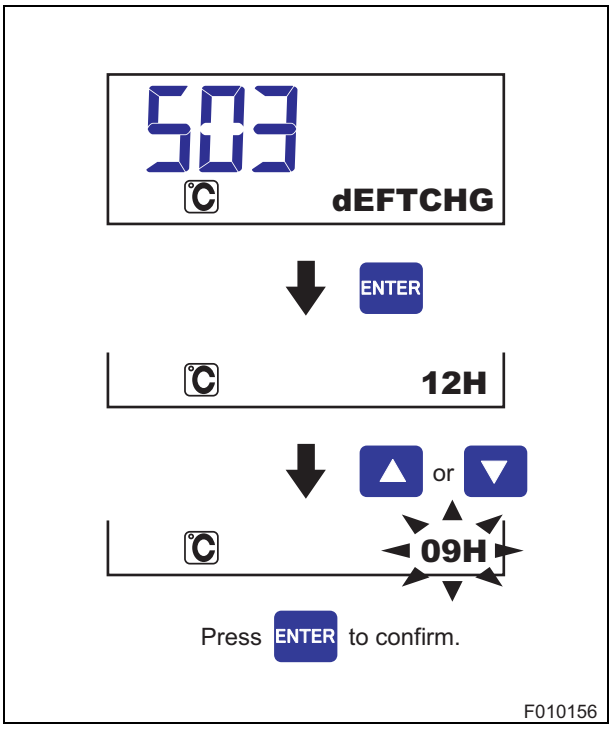
• Switch the temperature display (between Centigrade/Fahrenheit.)



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "SO2."
3) Press ENTER to display the present setting.
4) Use the ▲ and ▼ switches to toggle between Celsius and Fahrenheit.
5) Press ENTER to confirm the setting.

(3) Defrost Interval Change

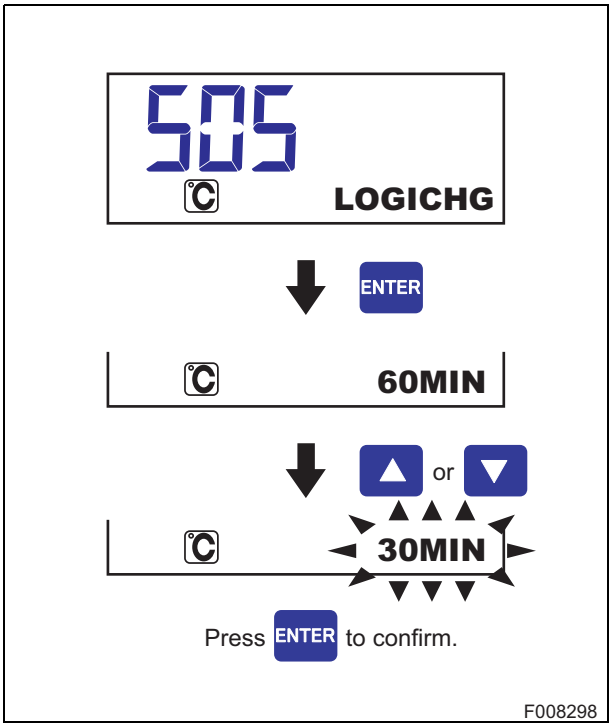
• Change the defrost interval with the timer.



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "SO3."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to change the defrost interval.
   Set values: 03H, 06H, 09H, 12H, 24H
5) Press ENTER to confirm the setting.

(4) Sensor Logging Interval Change

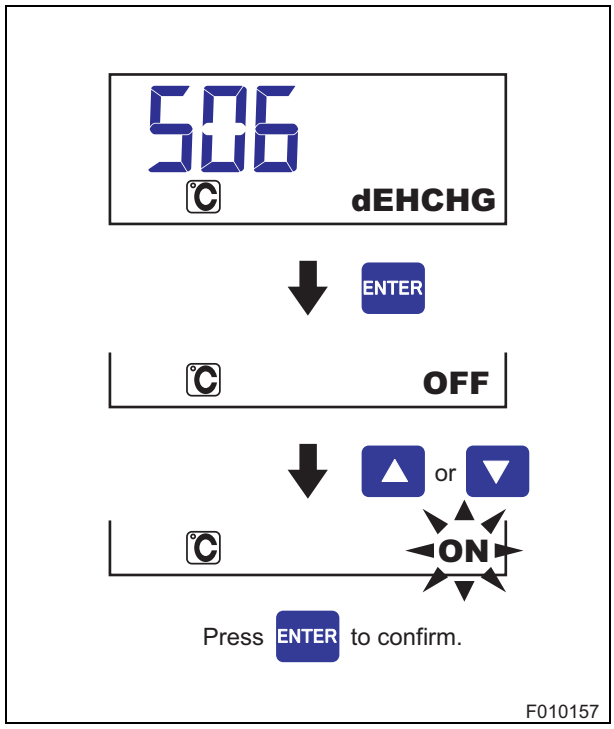
• Change the interval at which the sensor output is recorded.



1) Press SET to display "SO1".
2) Use the ▲ and ▼ switches to display "SO5."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to change the interval.
   Set values: 15 min, 30 min, 60 min, 120 min
5) Press ENTER to confirm the setting.

(5) Dehumidification Operation Settings

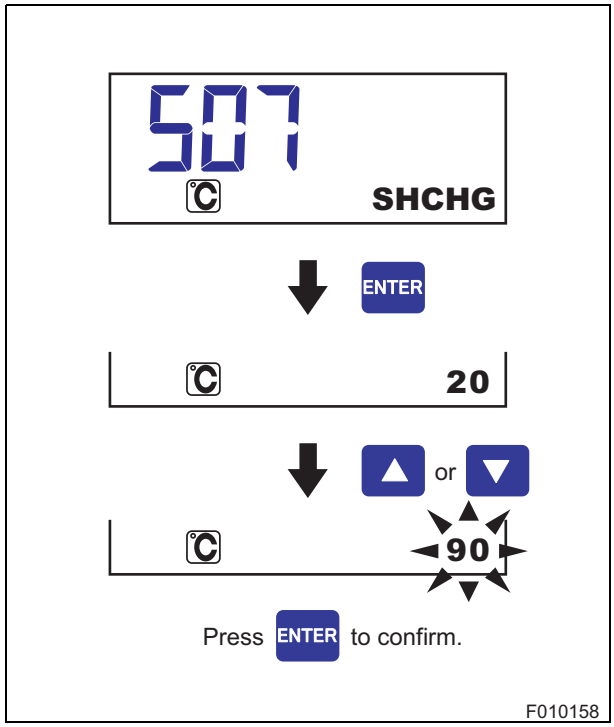
• Set the dehumidification mode.



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "S06."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to toggle between ON and OFF.
5) Press ENTER to confirm the setting.

(6) Set Humidity Change

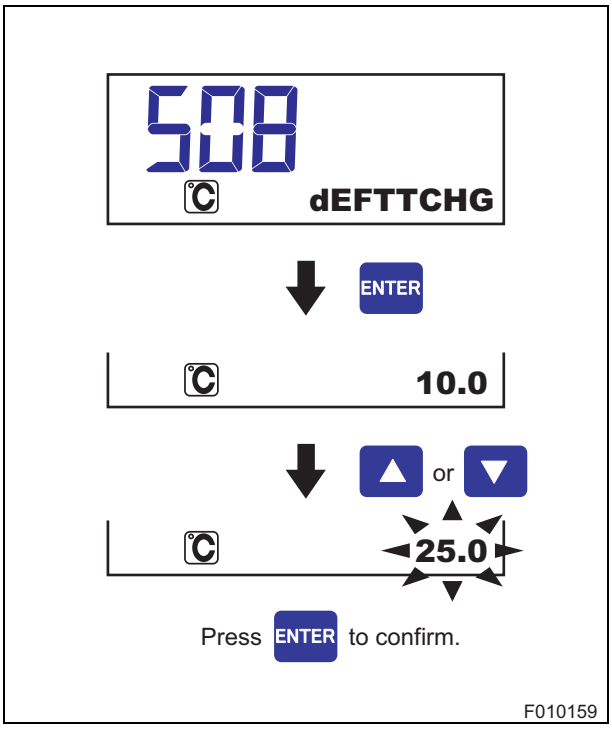
• Change the container-internal set humidity to the desired value.



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "S07."
3) Press ENTER to display the current set humidity.
4) Use the ▲ or ▼ switch to set the desired humidity.
   Press and hold either switch to cycle through the digits successively.
5) Press ENTER to confirm the setting.

(7) Defrost Completion Temperature Change

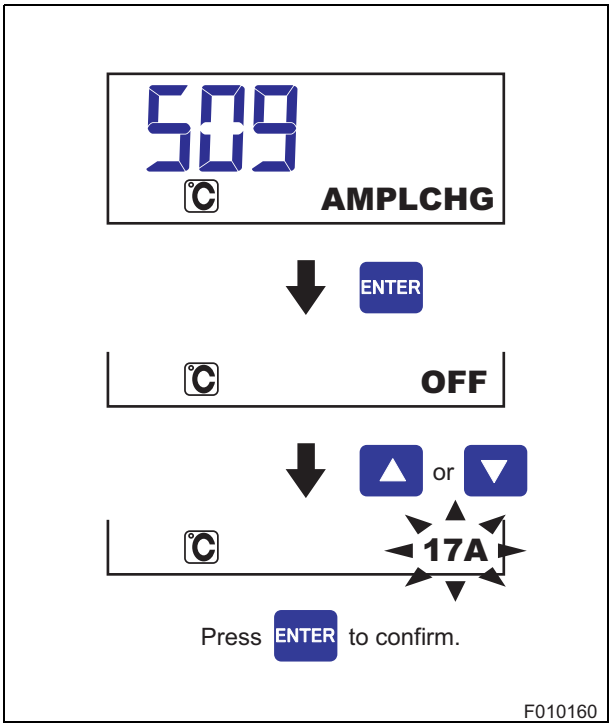
• Change the defrost completion temperature.



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "S08."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to change the defrost completion temperature.
   Set temperature: 10°C, 25°C
5) Press ENTER to confirm the setting.

(8) Current Limit

• Set the current limit.



1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "SO9."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to change the current limit.
   Set values: 10.5 A, 13 A, 15 A, 17 A, 19 A
5) Press ENTER to confirm the setting.

(9) Battery Check

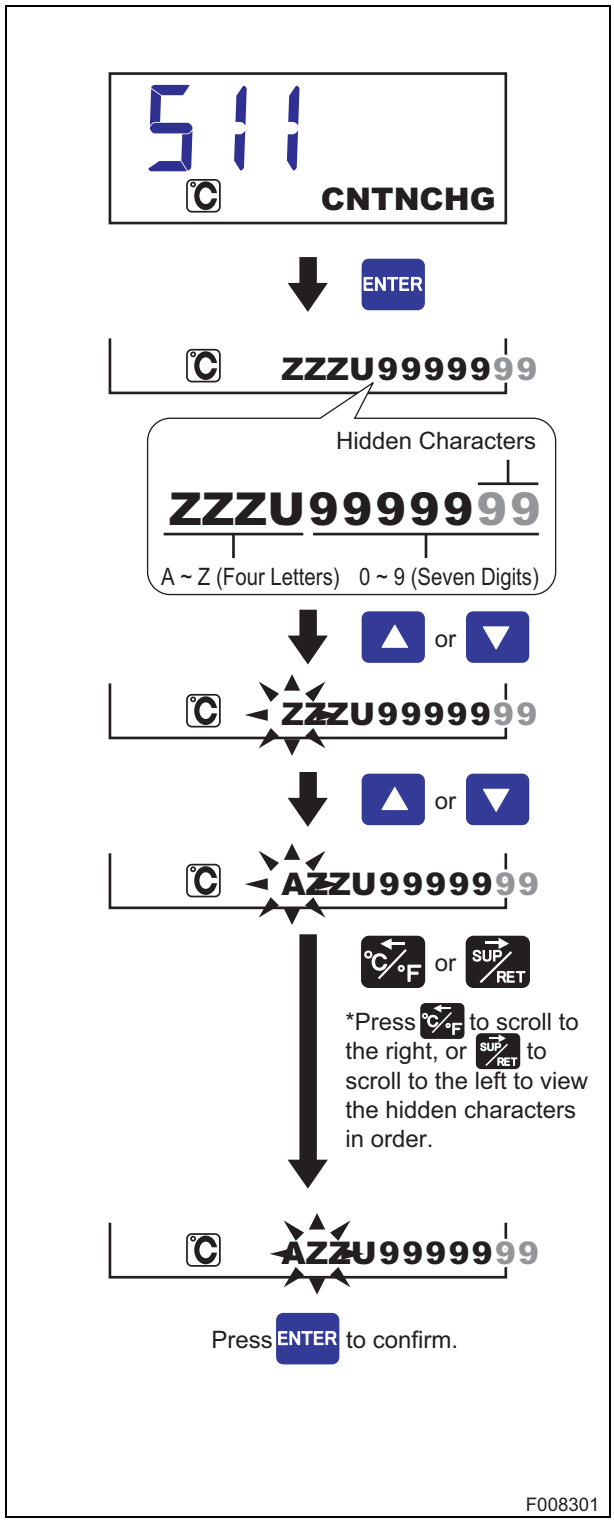
• Verify the battery voltage.

1) Press SET to display "SO1".
2) Use the ▲ or ▼ switch to display "S10."
3) Press ENTER to check the battery voltage.
   When the check is completed successfully, the battery voltage will display. When the battery is not connected, a value of 10.1 V or more will display.

4.9 Operating Method for Setting Menu 2

(1) Container ID Code

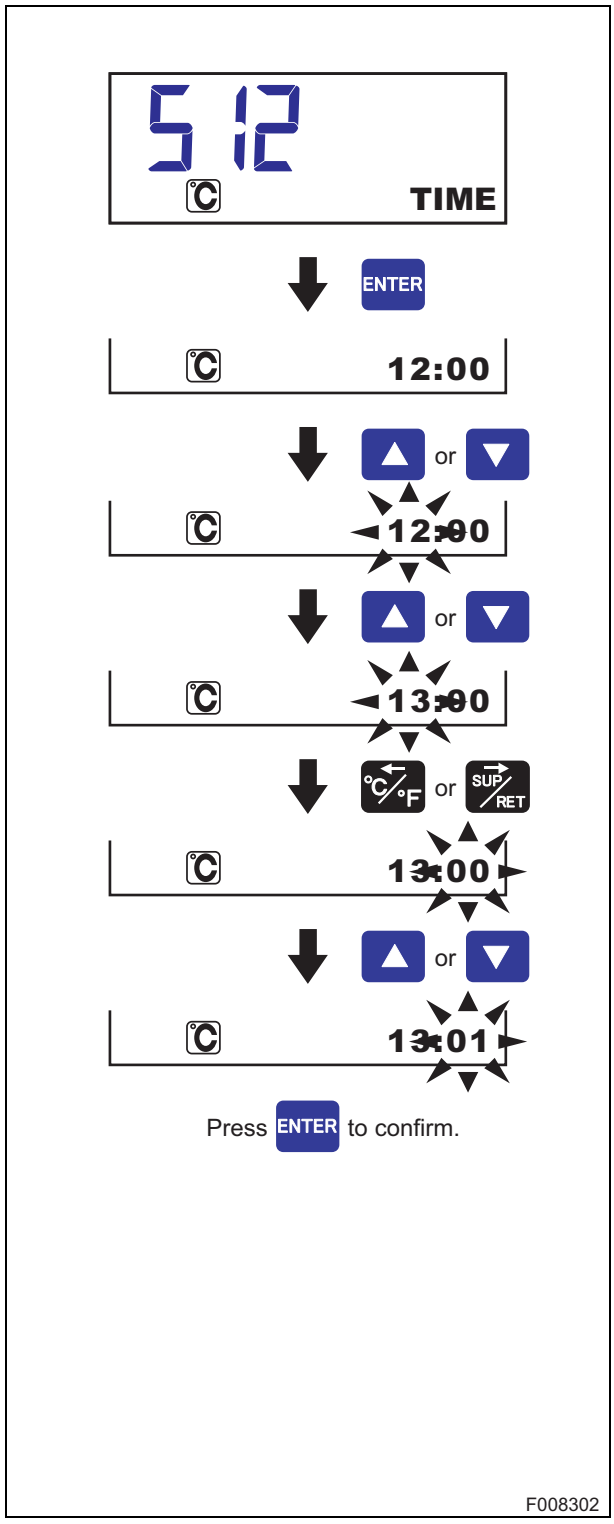
• Register the container ID code.



1) Press and hold SET for approximately three seconds to display "S11."
2) Press ENTER to show a scroll display of the present setting.
3) Pressing °C/°F, SUP/RET, ▲, or ▼ will cause the left end of the character string to flash.
4) Use the ▲ or ▼ switch to change the flashing characters.
5) Use the °C/°F or SUP/RET switch to change between flashing characters.
6) Change the first character, then repeat the process for the remaining character.
7) Press ENTER to confirm.
   Normally, the container ID code will be shown in a scroll display. However, during an abnormality, "ERROR" will be displayed.

(2) Time

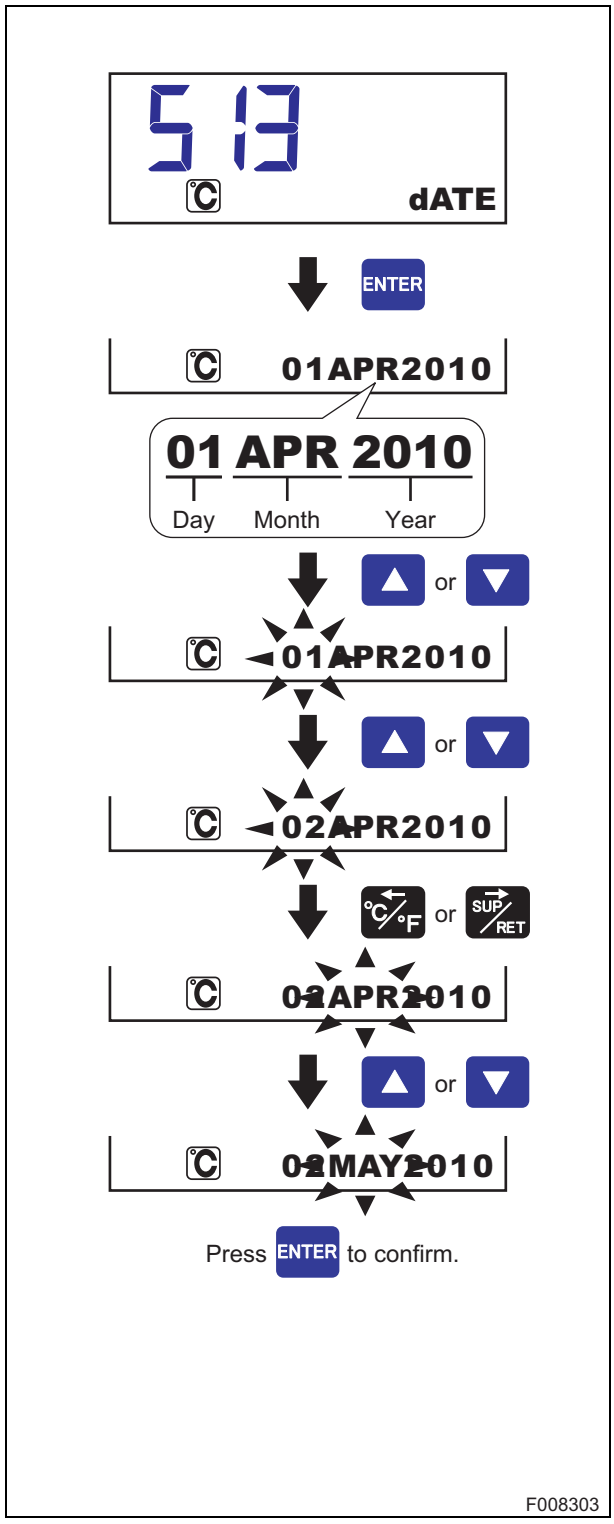
• Set the time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S12."
3) Press ENTER to display the time.
4) Pressing °C/°F, SUP/RET, ▲, or ▼ will cause the "hour" to flash.
5) Use the ▲ or ▼ switch to change the flashing value.
6) Use the °C/°F or SUP/RET switch to change to "minutes."
7) Use the ▲ or ▼ switch to change the value.
8) Press ENTER to confirm the setting.

(3) Date

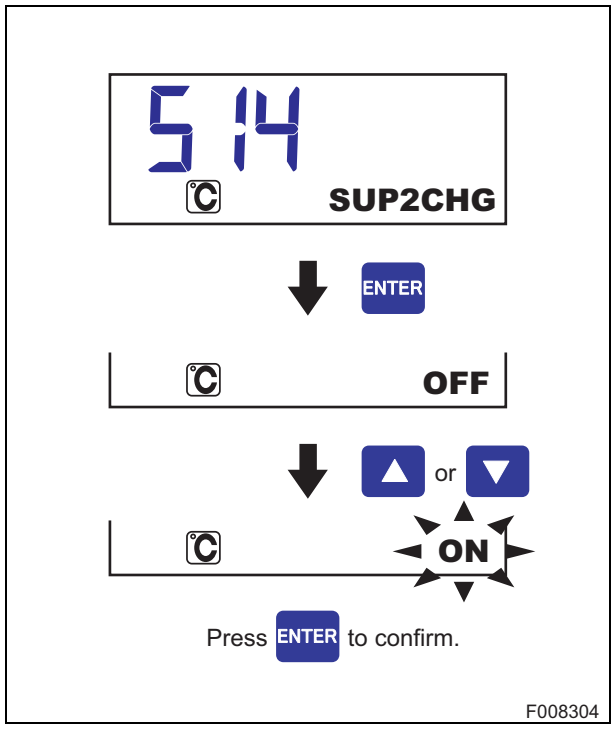
• Set the date.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S13."
3) Press ENTER to display the date.
4) Pressing °C/°F, SUP/RET, ▲, or ▼ will cause the "day" to flash.
5) Use the ▲ or ▼ switch to change the flashing "day."
6) Use the °C/°F or SUP/RET switch to toggle between the flashing "day", "month", and "year."
7) Use the ▲ or ▼ switch in the same fashion to change the remaining values.
8) Press ENTER to confirm the setting.

(4) Supply Air Temperature Sensor 2 Configuration

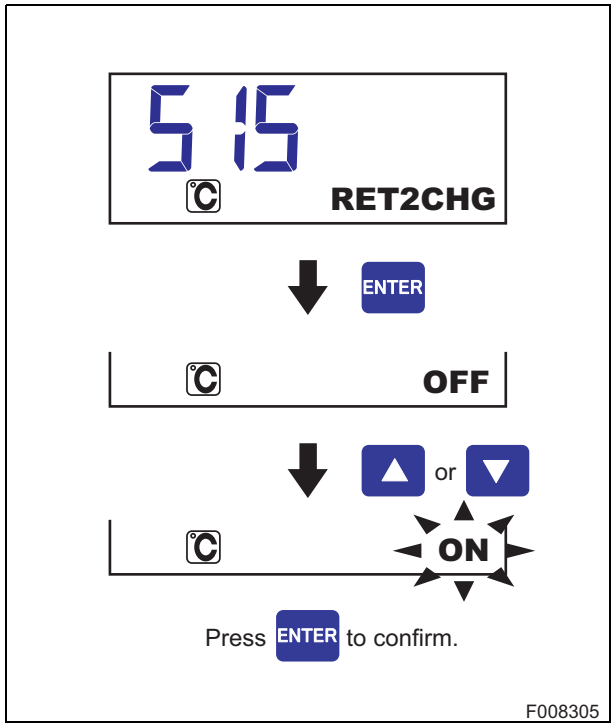
• Set supply air temperature sensor 2 ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S14."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the sensor "ON" or "OFF."
5) Press ENTER to confirm the setting.

(5) Return Air Temperature Sensor 2 Configuration

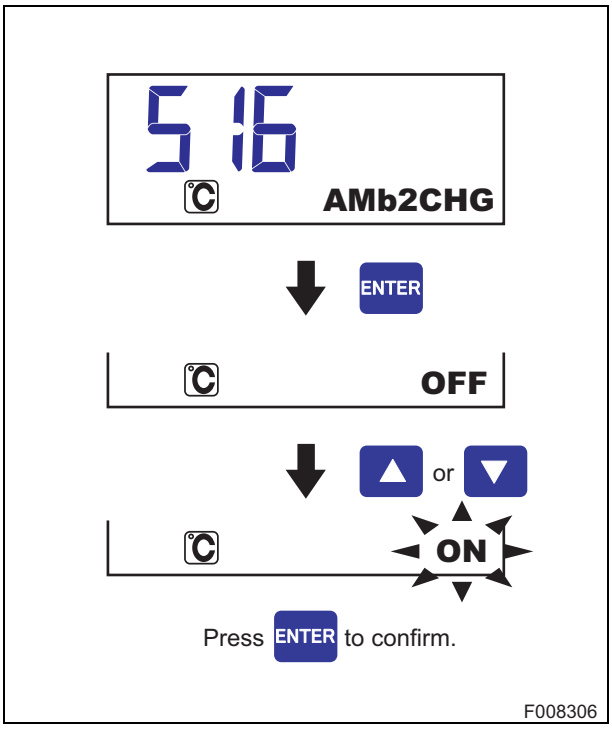
• Set return air temperature sensor 2 ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S15."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the sensor "ON" or "OFF."
5) Press ENTER to confirm the setting.

(6) Ambient Temperature Sensor 2 Configuration

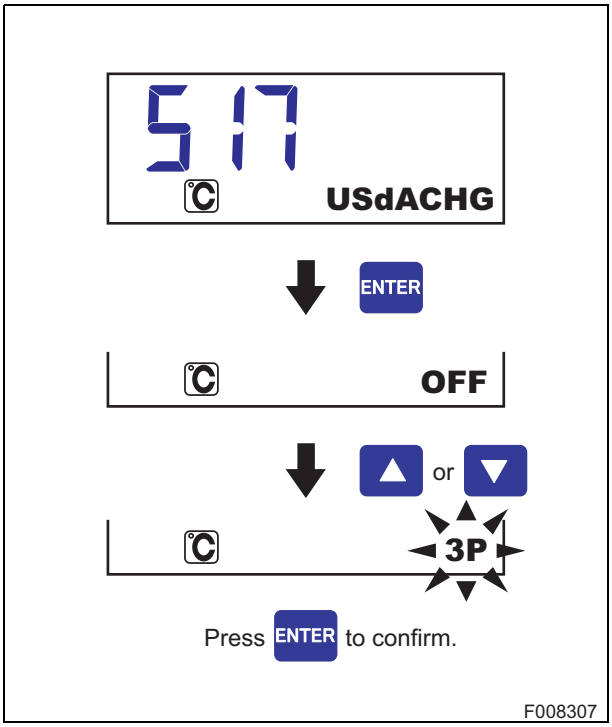
• Set ambient temperature sensor 2 ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S16."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the sensor "ON" or "OFF."
5) Press ENTER to confirm the setting.

(7) USDA Sensor Configuration

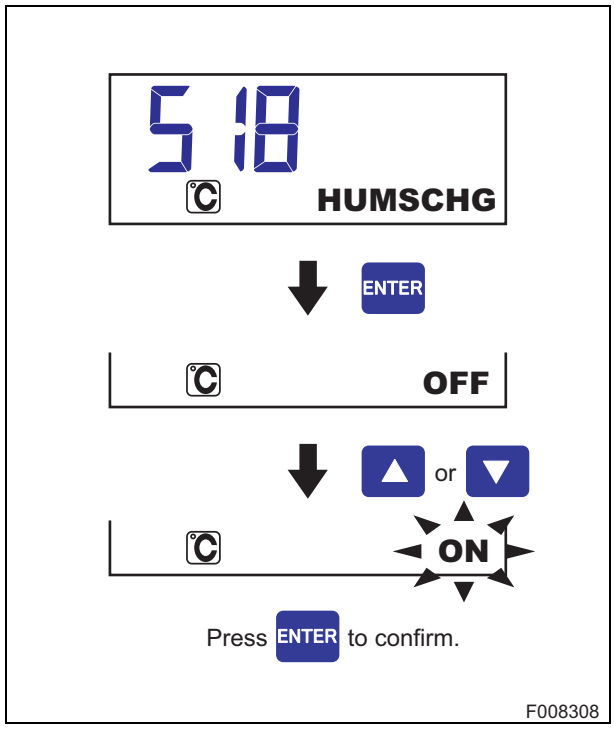
• Set the USDA sensor ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S17."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the USDA sensor.
   Set values: OFF (no sensor)
   3P (Using USDA #1 ~ 3)
   4P (Using USDA #1 ~ 4, Cargo)
5) Press ENTER to confirm the setting.

(8) Humidity Sensor Configuration

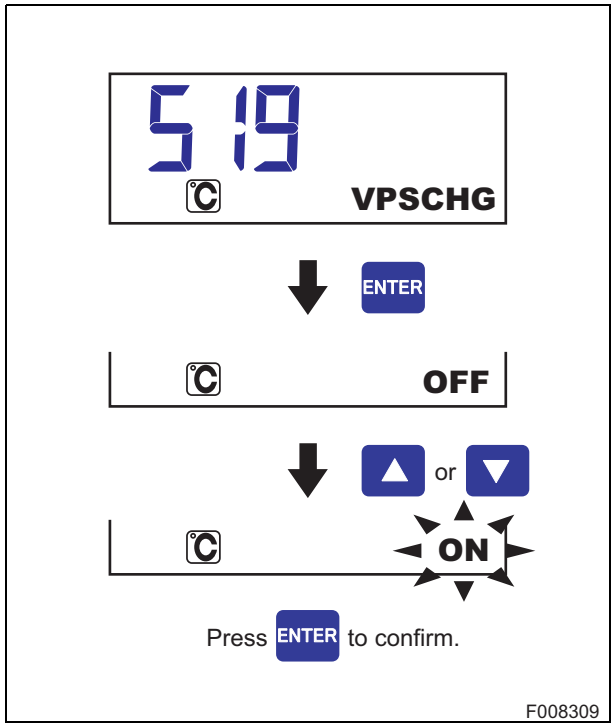
• Set the humidity sensor ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S18."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the sensor "ON" or "OFF."
5) Press ENTER to confirm the setting.

(9) Door Opening Sensor Configuration

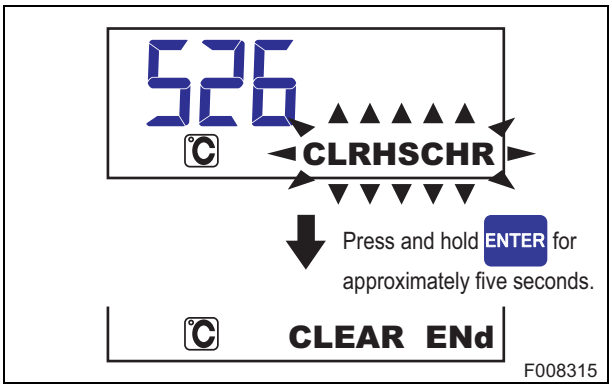
• Set the door opening sensor ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S19."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the sensor "ON" or "OFF."
5) Press ENTER to confirm the setting.

(10) High Stage Compressor Operating Time Clear

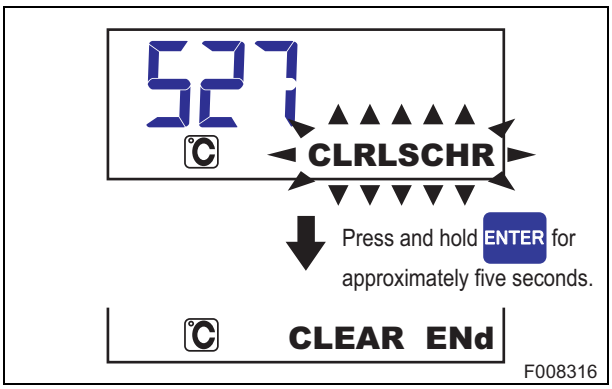
• Clear the high stage compressor operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S26."
3) When ENTER is pressed, "CLRHSCHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(11) Low Stage Compressor Operating Time Clear

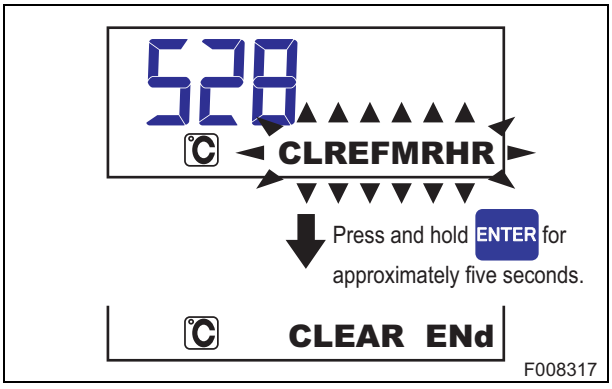
• Clear the low stage compressor operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S27."
3) When ENTER is pressed, "CLRLSCHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(12) Cooling Fan Motor 1 (Right Side) Operating Time Clear

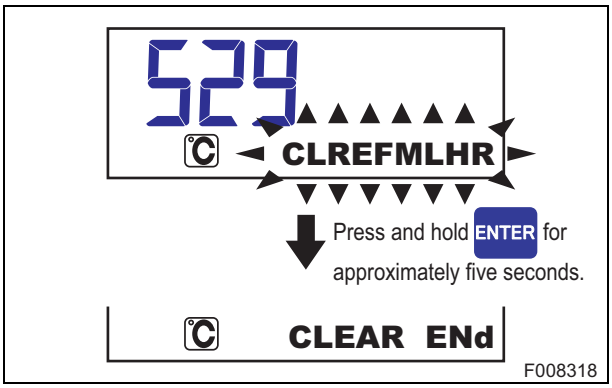
• Clear the cooling fan motor 1 (right side) operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S28."
3) When ENTER is pressed, "CLREFMRHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(13) Cooling Fan Motor 2 (Left Side) Operating Time Clear

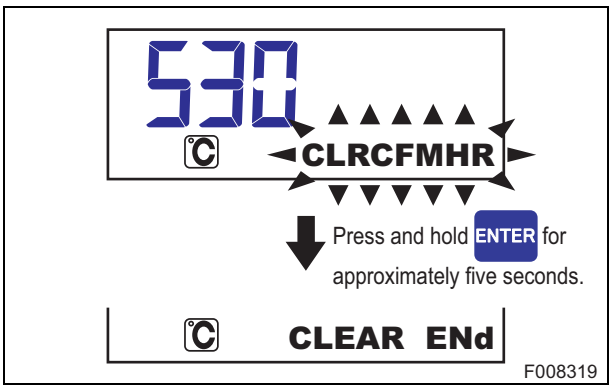
• Clear the cooling fan motor 2 (left side) operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S29."
3) When ENTER is pressed, "CLREFMLHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(14) Condenser Fan Motor Operating Time Clear

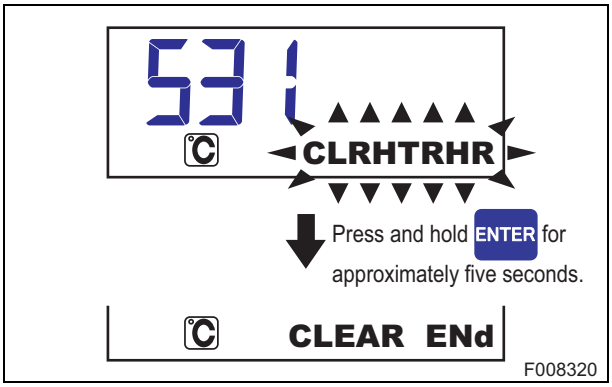
• Clear the condenser fan motor operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S30."
3) When ENTER is pressed, "CLRCFMHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(15) Heater Operating Time Clear

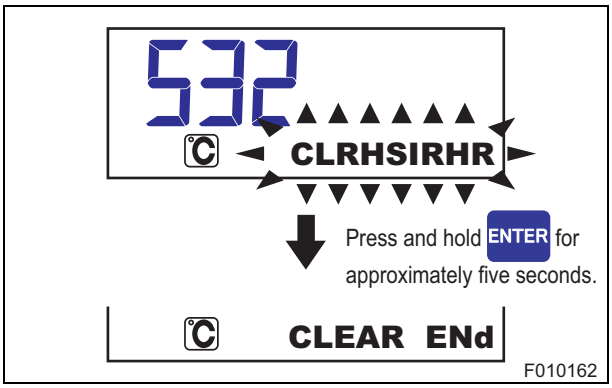
• Clear the heater operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S31."
3) When ENTER is pressed, "CLRHTRHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(16) High Stage Inverter Operating Time Clear

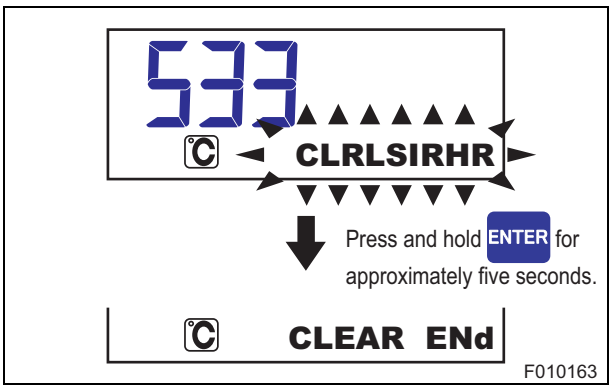
• Clear the high stage inverter operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S32."
3) When ENTER is pressed, "CLRHSIRHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(17) Low Stage Inverter Operating Time Clear

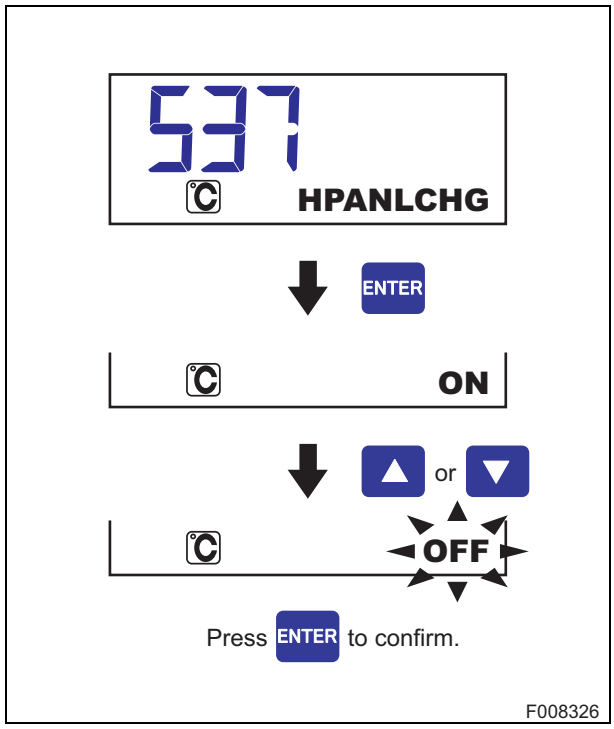
• Clear the low stage inverter operating time.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S33."
3) When ENTER is pressed, "CLRLSIRHR" will flash.
4) Press and hold ENTER for approximately five seconds to clear the operating time.

(18) Transport Refrigerator Operation During a High-Pressure Abnormality

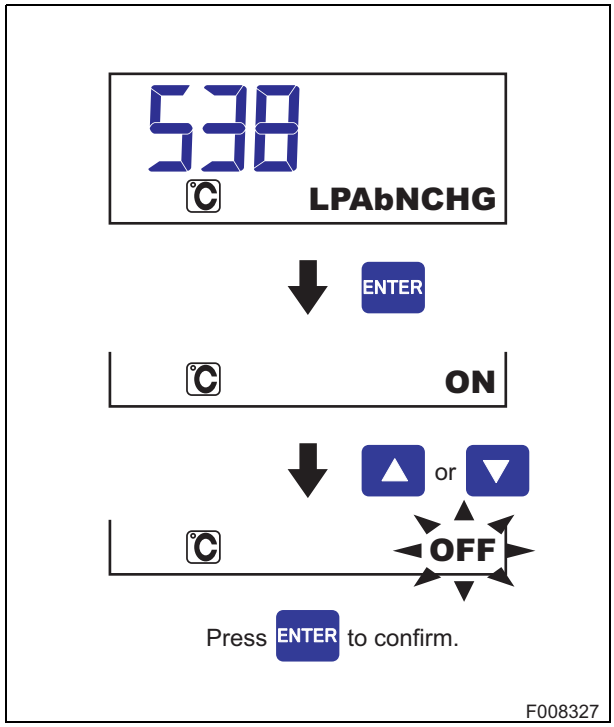
• Set the transport refrigerator to continue/stop operating during a high pressure abnormality.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S37."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the transport refrigerator to remain ON (continue operating) or to turn OFF (stop operating).
5) Press ENTER to confirm the setting.

(19) Transport Refrigerator Operation During a Low-Pressure Abnormality

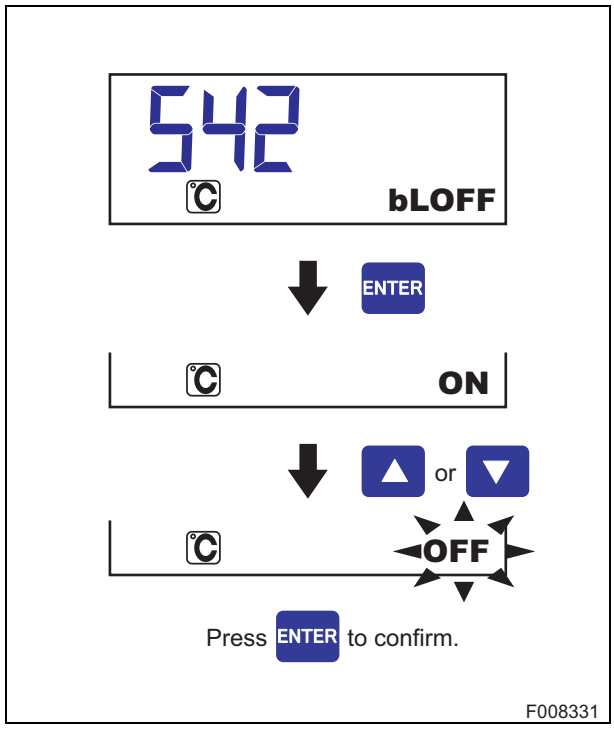
• Set the transport refrigerator to continue/stop operating during a low pressure abnormality.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S38."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the transport refrigerator to remain ON (continue operating) or to turn OFF (stop operating).
5) Press ENTER to confirm the setting.

(20) LCD Backlight ON/OFF

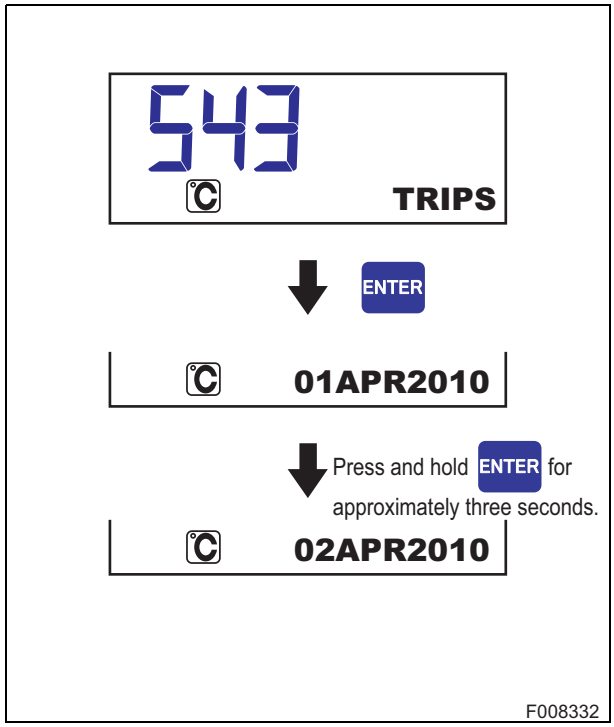
• Set the LCD backlight ON or OFF.



1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S42."
3) Press ENTER to display the present setting.
4) Use the ▲ or ▼ switch to set the backlight ON or OFF.
5) Press ENTER to confirm the setting.

(21) Trip Start

• Set the departure date used for the last trip readout log data.

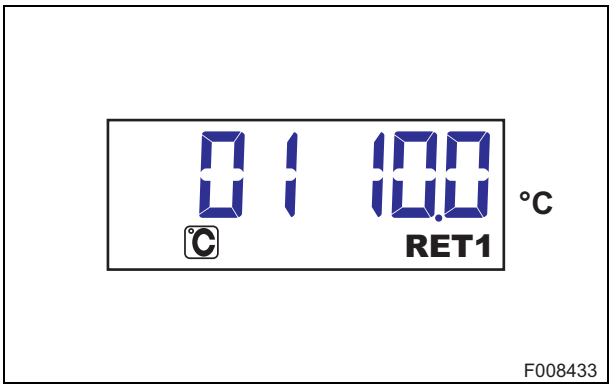


1) Press and hold SET for approximately three seconds to display "S11."
2) Use the ▲ or ▼ switch to display "S43."
3) Press ENTER to display the present setting.
4) Press and hold ENTER for approximately three seconds to display today's date.
   Today's date will be set as the departure.

4.10 Information Display Menu Operation

(1) Return Air temperature 1 Display

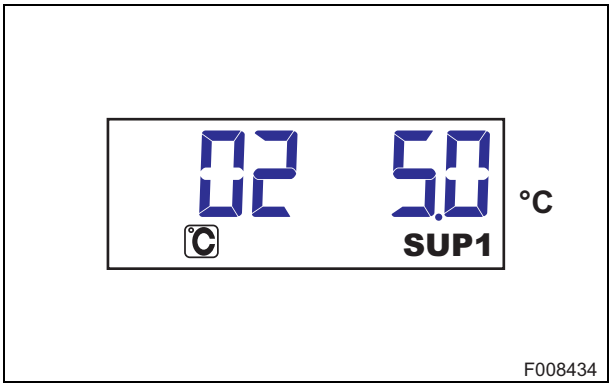
• Display the present return air temperature 1 (°C).



1) Press DATA to display "01".
2) The return air temperature 1 (°C) will appear as the measured value.

(2) Supply Air Temperature 1 Display

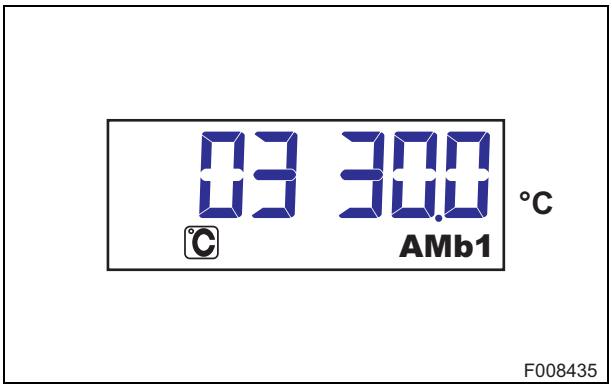
• Display the present supply air temperature 1 (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "02."
3) The supply air temperature 1 (°C) will appear as the measured value.

(3) Ambient Temperature 1 Display

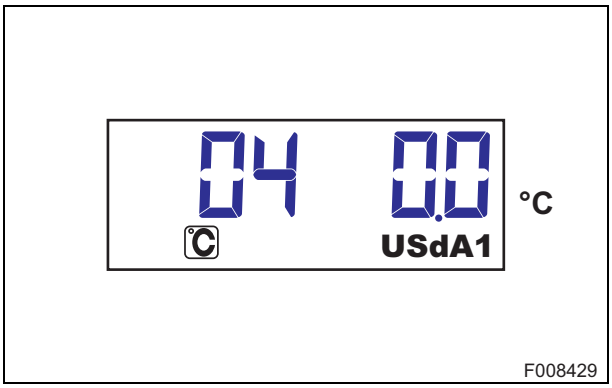
• Display the present ambient temperature 1 (°C).



1) Press DATA to display "01".
2) Use the ▲ or ▼ switch to display "03."
3) The ambient temperature 1 (°C) will appear as the measured value.

(4) USDA1 Temperature Display

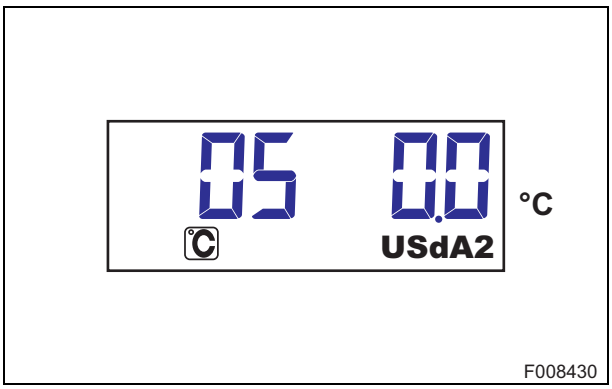
• Display the present USDA1 temperature (°C).(Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "04."
3) The USDA1 temperature (°C) will appear as the measured value.

(5) USDA2 Temperature Display

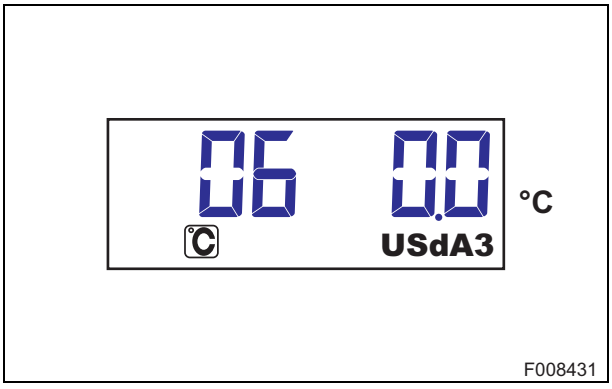
• Display the present USDA2 temperature (°C). (Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "05."
3) The USDA2 temperature (°C) will appear as the measured value.

(6) USDA3 Temperature Display

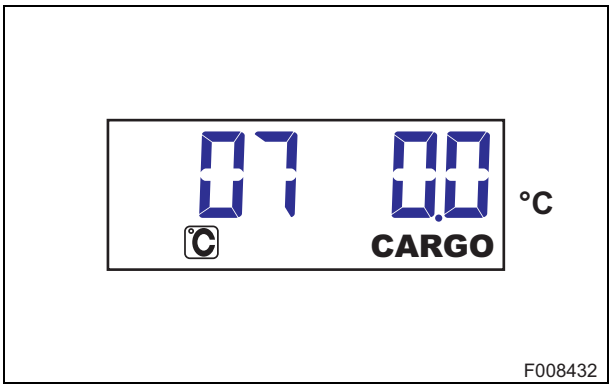
• Display the present USDA3 temperature (°C). (Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "06."
3) The USDA3 temperature (°C) will appear as the measured value.

(7) Cargo Temperature Display

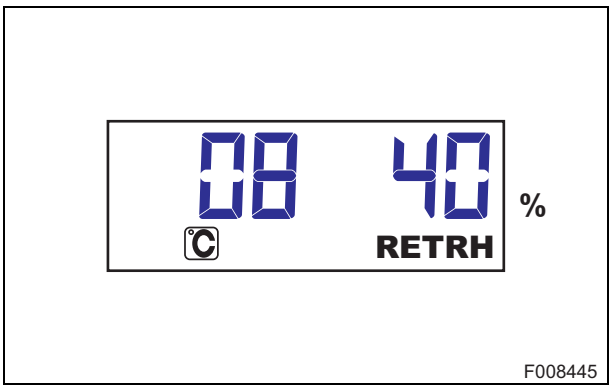
• Display the present cargo sensor temperature (°C). (Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "07."
3) The cargo sensor temperature (°C) will appear as the measured value.

(8) Relative Humidity Display

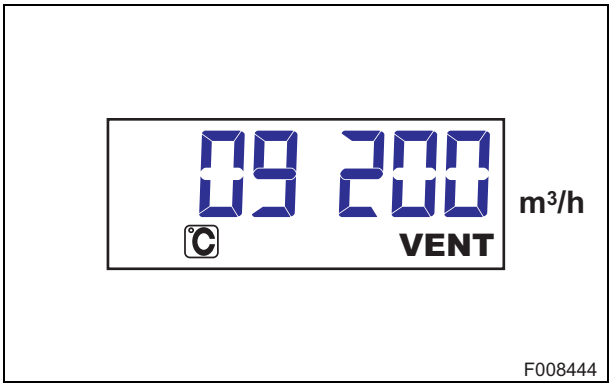
• Display the present relative humidity (%.) (Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "08."
3) The relative humidity (%) value will appear as the measured value.

(9) Ventilation Flow Volume Display

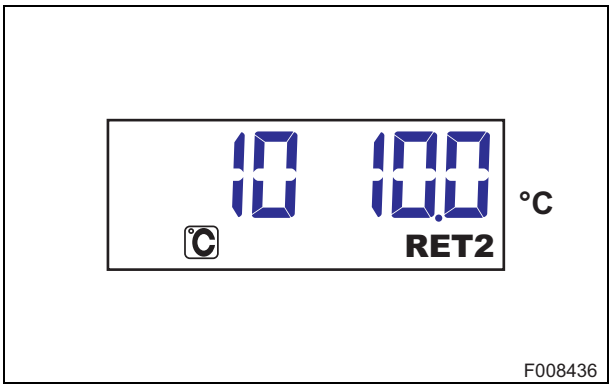
• Display the present ventilation flow volume (m^3/h.) (Skipped when the sensor is set to OFF.)



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "09."
3) The flow volume (m^3/h) will appear as the measured value.

(10) Return Air Temperature 2 Display

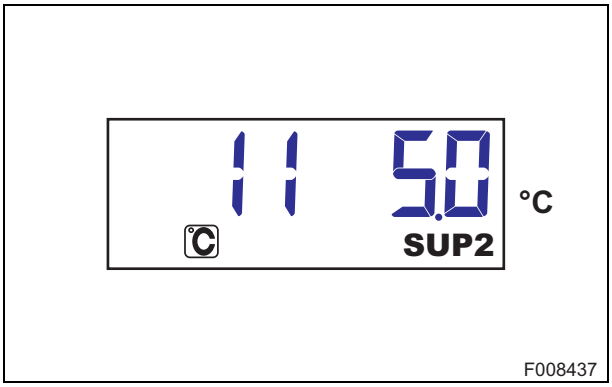
• Display the present return air temperature 2 (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "10."
3) The return air temperature 2 (×C) will appear as the measured value.

(11) Supply Air Temperature 2 Display

• Display the present supply air temperature 2 (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "11."
3) The supply air temperature 2 (°C) will appear as the measured value.

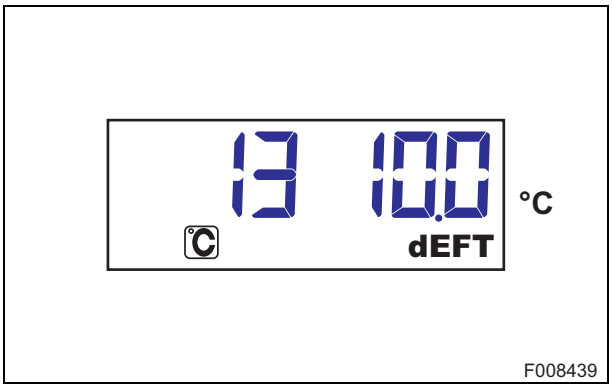
(12) Ambient Temperature 2 Display

• Display the present ambient temperature 2 (°C).

1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "12."
3) The ambient temperature 2 (°C) will appear as the measured value.

(13) Defrost Temperature Display

• Display the present defrost temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "13."
3) The defrost temperature (°C) will appear as the measured value.

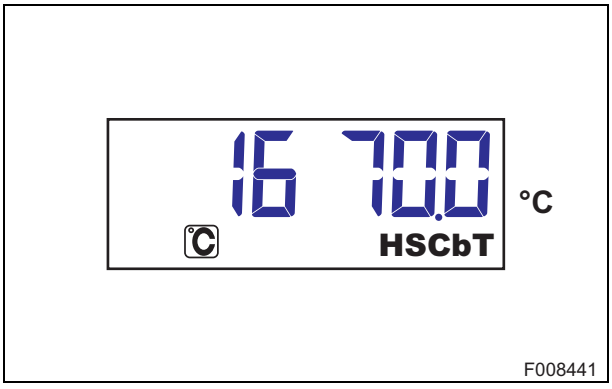
(14) High Stage Compressor Discharge Temperature Display

• Display the present high stage compressor discharge temperature (°C).

1) Press DATA display "01."
2) Use the ▲ or ▼ switch to display "14."
3) The high stage compressor discharge temperature (°C) value will appear as the measured value.

(15) High Stage Compressor Body Temperature Display

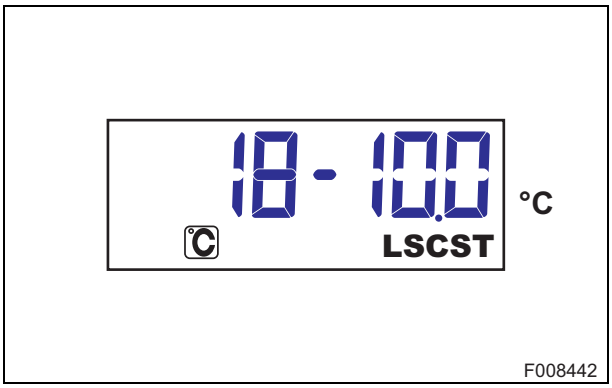
• Display the present high stage compressor body temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "16."
3) The high stage compressor body temperature (°C) will appear as the measured value.

(16) Low Stage Compressor Suction Temperature Display

• Display the present low stage compressor suction temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "18."
3) The low stage compressor suction temperature (°C) will appear as the measured value.

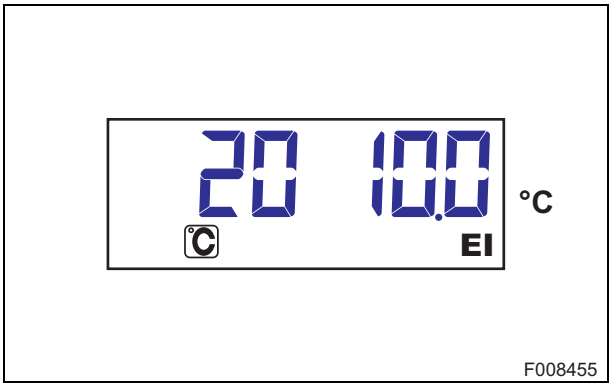
(17) Low Stage Compressor Body Temperature Display

• Display the present low stage compressor body temperature (°C).

1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "19."
3) The low stage compressor body temperature (°C) will appear as the measured value.

(18) Evaporator Inlet Temperature Display

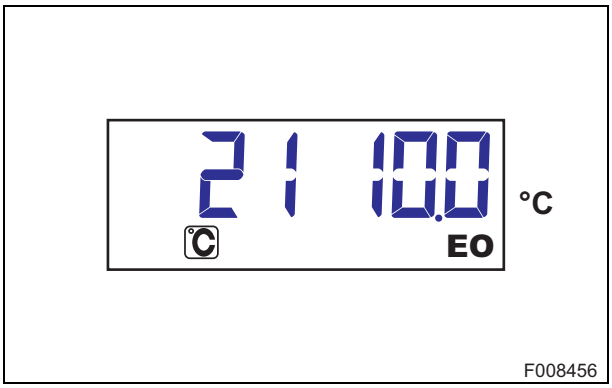
• Display the present evaporator inlet temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "20."
3) The evaporator inlet temperature (°C) will display as the measured value.

(19) Evaporator Outlet Temperature Display

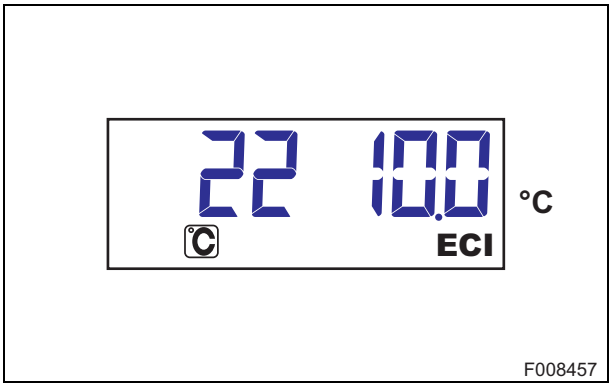
- Display the present evaporator outlet temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "21."
3) The evaporator outlet temperature (°C) will display as the measured value.

(20) Economizer Inlet Temperature Display

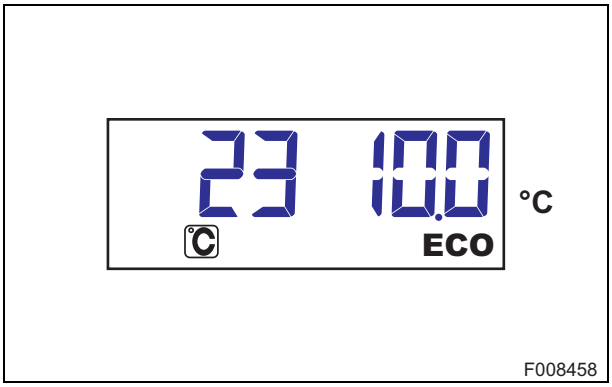
- Display the present economizer inlet temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "22."
3) The present economizer inlet temperature (°C) will be displayed as the measured value.

(21) Economizer Outlet Temperature Display

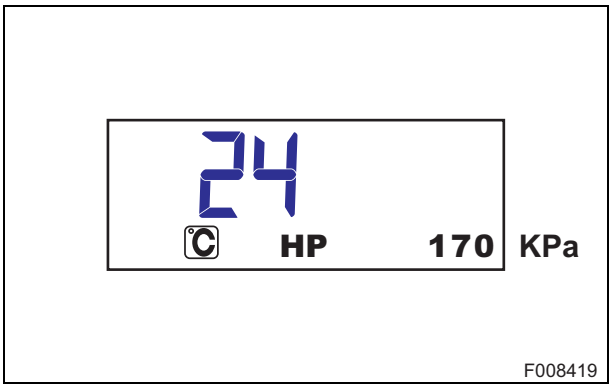
- Display the present economizer outlet temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "23."
3) The present economizer outlet temperature (°C) will be displayed as the measured value.

(22) High Pressure Display

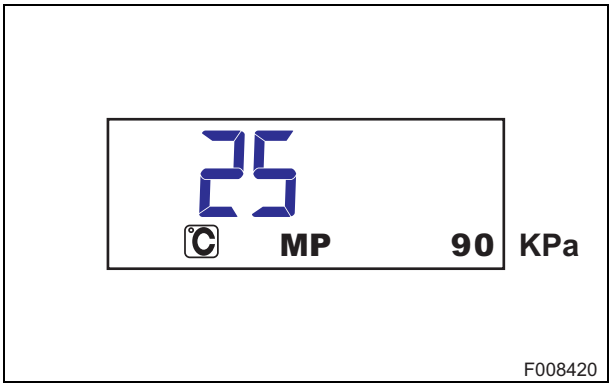
• Display the present high-pressure value (KPa).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "24."
3) The high-pressure value (KPa) will appear on the sub-display.

(23) Middle Pressure Display

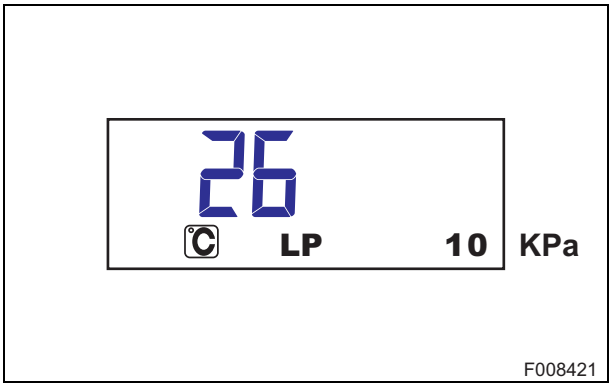
• Display the present middle pressure value (KPa).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "25."
3) The middle pressure value (KPa) will appear on the sub-display.

(24) Low-Pressure Display

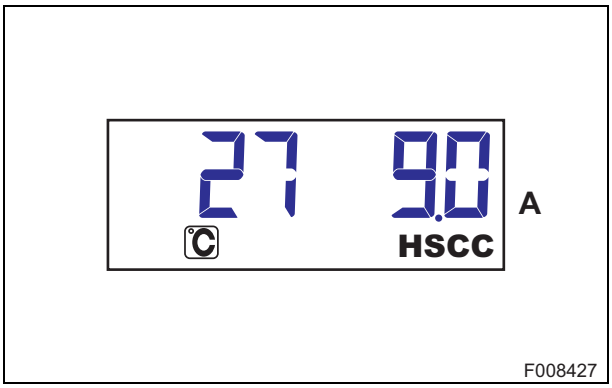
• Display the present low-pressure value (KPa).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "26."
3) The low-pressure value (KPa) will appear on the sub-display.

(25) High Stage Compressor Current Display

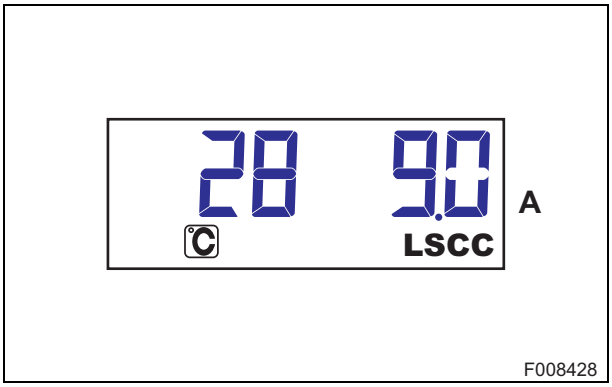
- Display the present high stage compressor current (A).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "27."
3) The high stage compressor current (A) will appear as the measured value.

(26) Low Stage Compressor Current Display

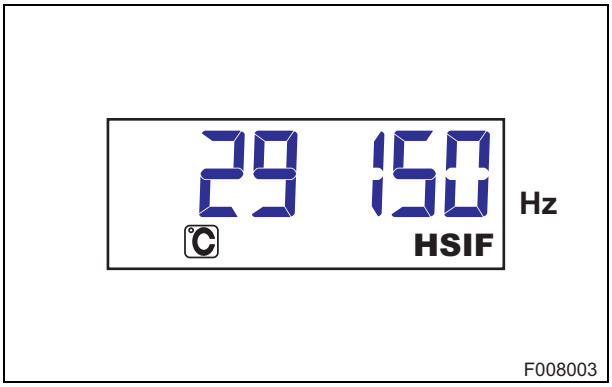
- Display the present low stage compressor current (A).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "28."
3) The low stage compressor current (A) will appear as the measured value.

(27) High Stage Inverter Frequency Display

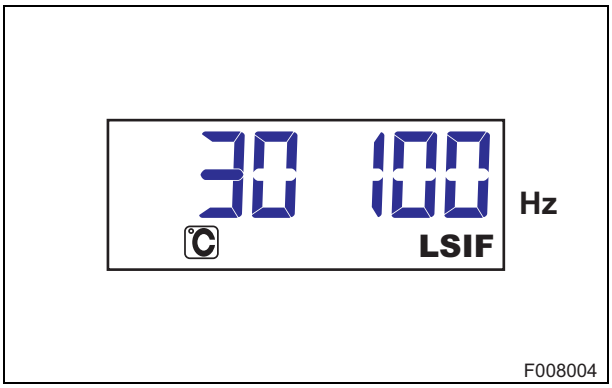
- Display the present high stage inverter frequency (Hz).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "29."
3) The high stage inverter frequency (Hz) will appear as the measured value.

(28) Low Stage Inverter Frequency Display

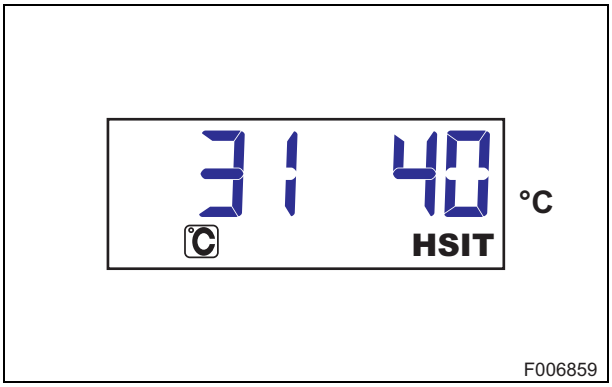
• Display the present low stage inverter frequency (Hz).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "30."
3) The low stage inverter frequency (Hz) value will appear as the measured value.

(29) High Stage Inverter Temperature Display

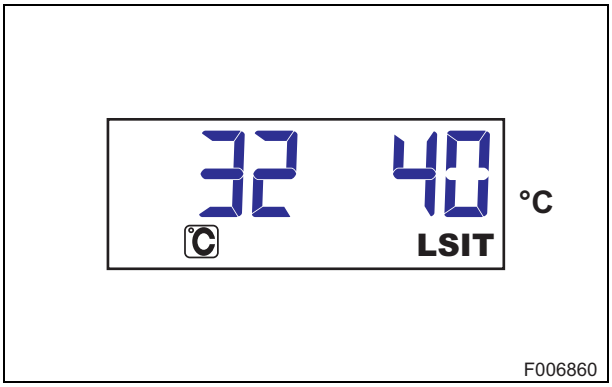
• Display the present high stage inverter temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "31."
3) The high stage inverter temperature (°C) will appear as the measured value.

(30) Low Stage Inverter Temperature Display

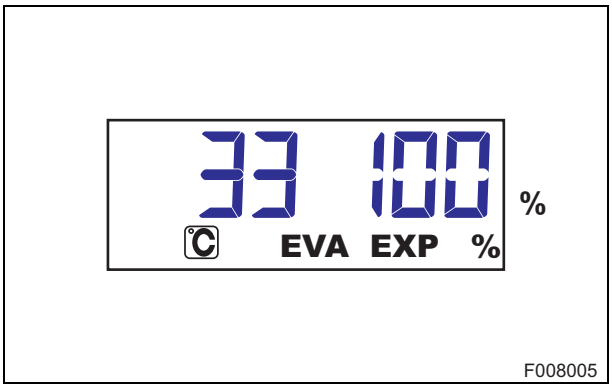
• Display the present low stage inverter temperature (°C).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "32."
3) The low stage inverter temperature (°C) will appear as the measured value.

(31) Evaporator Expansion Valve Opening Display

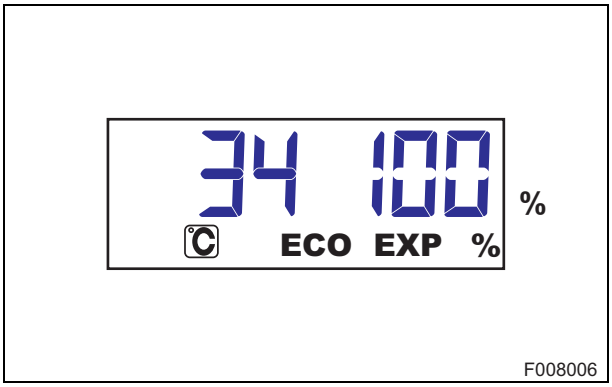
• Display the present percentage of evaporator expansion valve opening (%).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "33."
3) The percentage of evaporator expansion valve opening (%) will appear as the measured value.

(32) Economizer Expansion Valve Opening Display

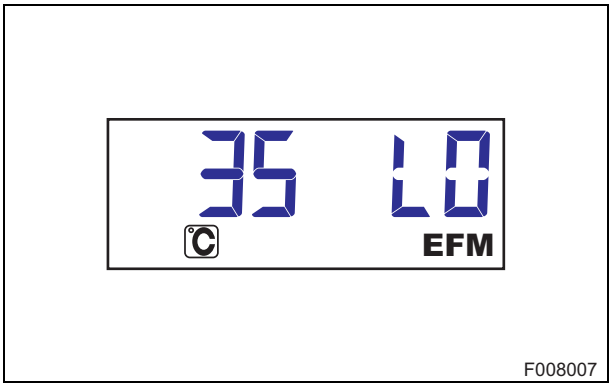
• Display the present percentage of economizer expansion valve opening (%).



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "34."
3) The percentage of economizer expansion valve opening (%) will appear as the measured value.

(33) Cooling Fan Status Display

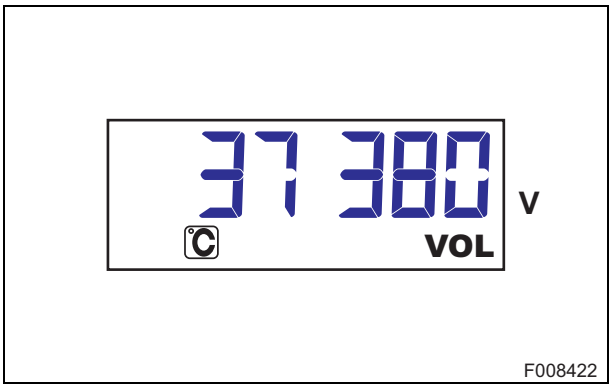
• Display the present status of the cooling fan.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "35."
3) The cooling fan status will appear as the measured value.
   Cooling fan status: OFF, LO, HI

(34) Main Power Supply Voltage Display

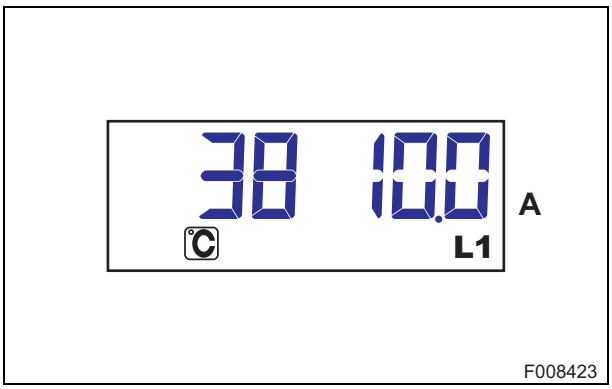
• Display the present voltage (V) for the main power supply.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "37."
3) The voltage (V) for the main power supply will appear as the measured value.

(35) Main Power Supply U-Phase Current Display

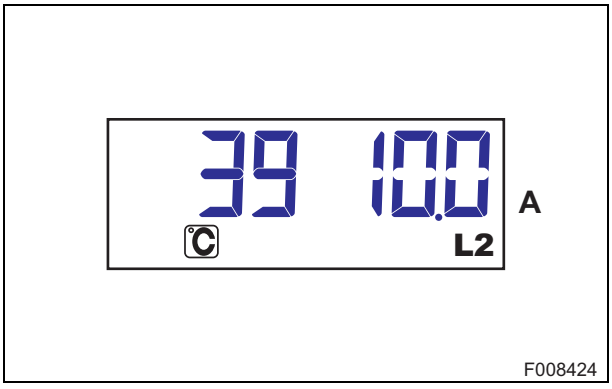
• Display the present U-phase current (A) for the main power supply.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "38."
3) The U-phase current (A) for the main power supply will appear as the measured value.

(36) Main Power Supply V-Phase Current Display

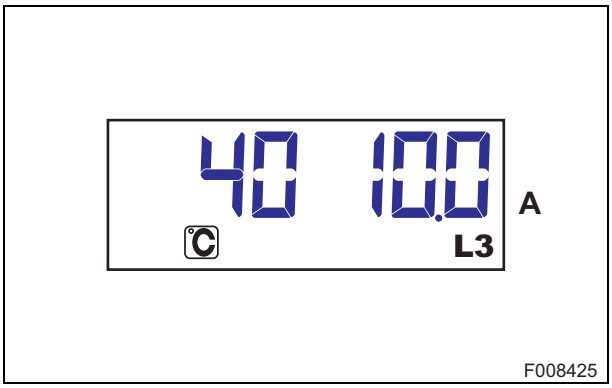
• Display the present V-phase current (A) for the main power supply.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "39."
3) The V-phase current (A) for the main power supply will appear as the measured value.

(37) Main Power Supply W-Phase Current Display

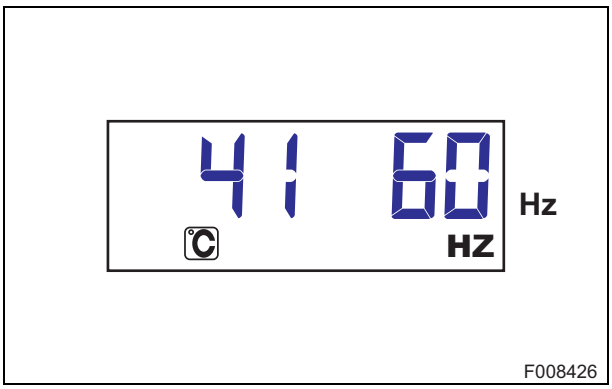
• Display the present W-phase current (A) for the main power supply.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "40."
3) The W-phase current (A) value for the main power supply will appear as the measured value.

(38) Main Power Supply Frequency Display

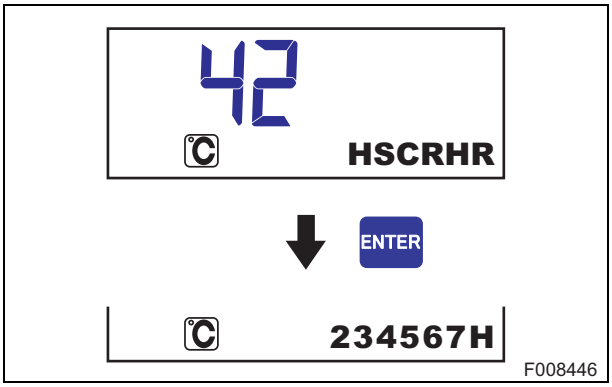
• Display the present frequency (Hz) for the main power supply.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "41."
3) The frequency (Hz) for the main power supply will appear as the measured value.

(39) High Stage Compressor Operating Time Display

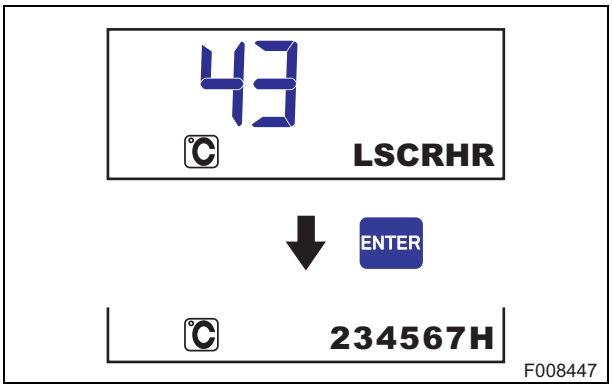
• Display the high stage compressor operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "42."
3) Press ENTER to show the high stage compressor operating time on the sub-display.

(40) Low Stage Compressor Operating Time Display

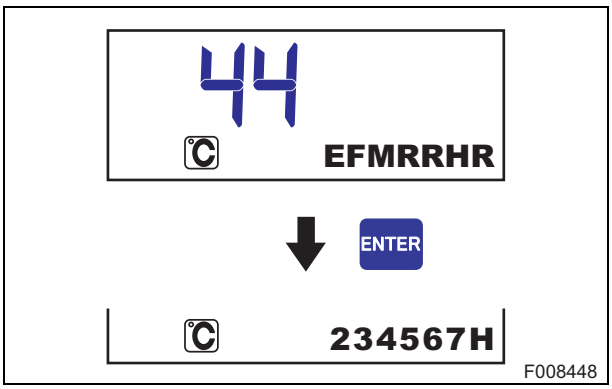
• Display the low stage compressor operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "43."
3) Press ENTER to show the low stage compressor operating time on the sub-display.

(41) Cooling Fan Motor 1 (Right Side) Operating Time Display

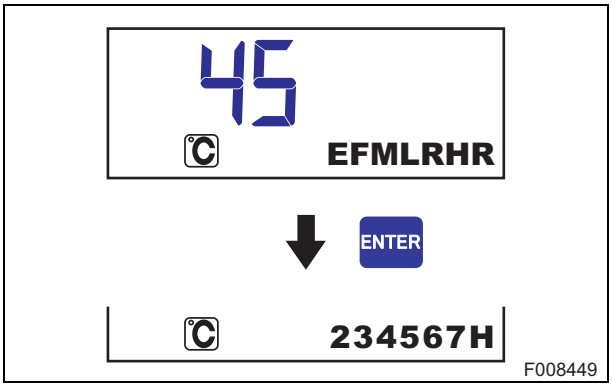
• Display the cooling fan motor 1 (right side) operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "44."
3) Press ENTER to show the cooling fan motor 1 (right side) operating time on the sub-display.

(42) Cooling Fan Motor 2 (Left Side) Operating Time Display

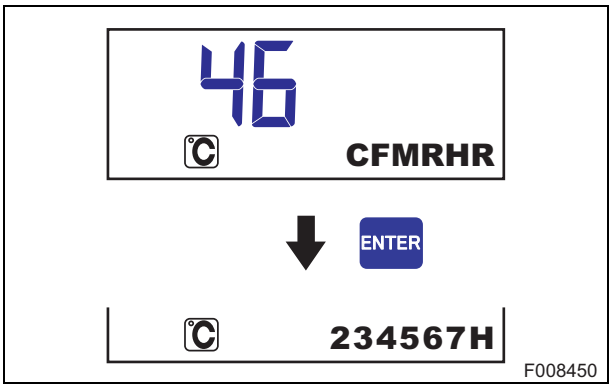
• Display the cooling fan motor 2 (left side) operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "45."
3) Press ENTER to show the cooling fan motor 2 (left side) operating time on the sub-display.

(43) Condenser Fan Motor Operating Time Display

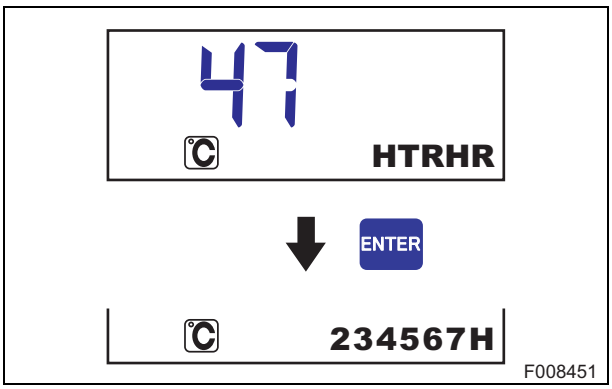
• Display the condenser fan motor operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "46."
3) Press ENTER to show the condenser fan motor operating time on the sub-display.

(44) Heater Operating Time Display

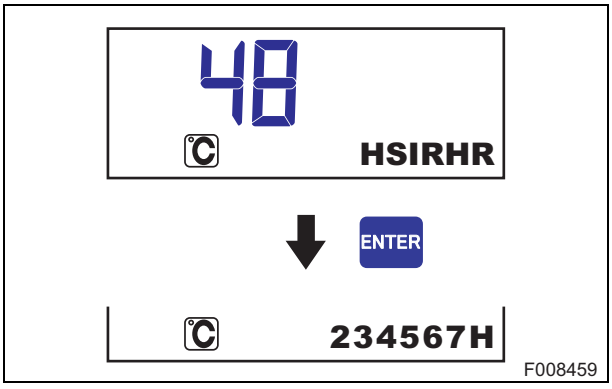
• Display the heater operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "47."
3) Press ENTER to show the heater operating time on the sub-display.

(45) High Stage Inverter Operating Time Display

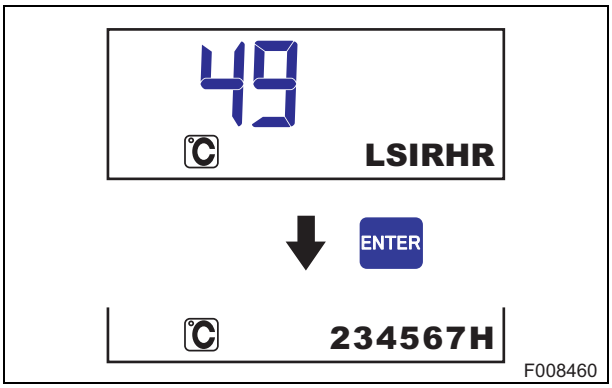
• Display the high stage inverter operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "48."
3) Press ENTER to show the high stage inverter operating time on the sub-display.

(46) Low Stage Inverter Operating Time Display

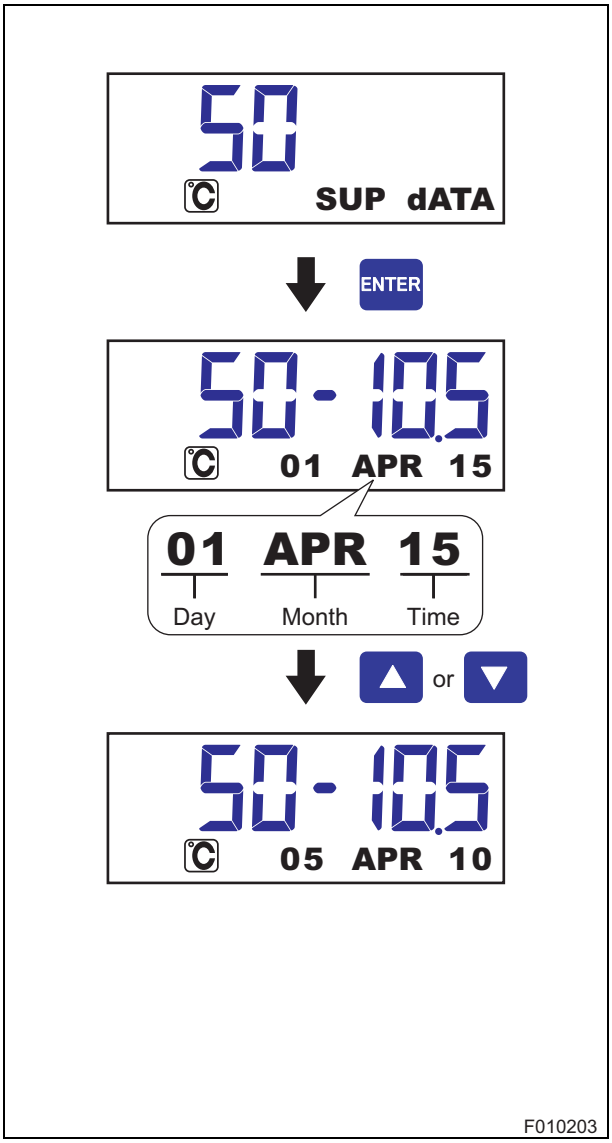
• Display the low stage inverter operating time accumulated up until the present.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "49."
3) Press ENTER to show the low stage inverter operating time on the sub-display.

(47) Supply Air Temperature Log Data Display

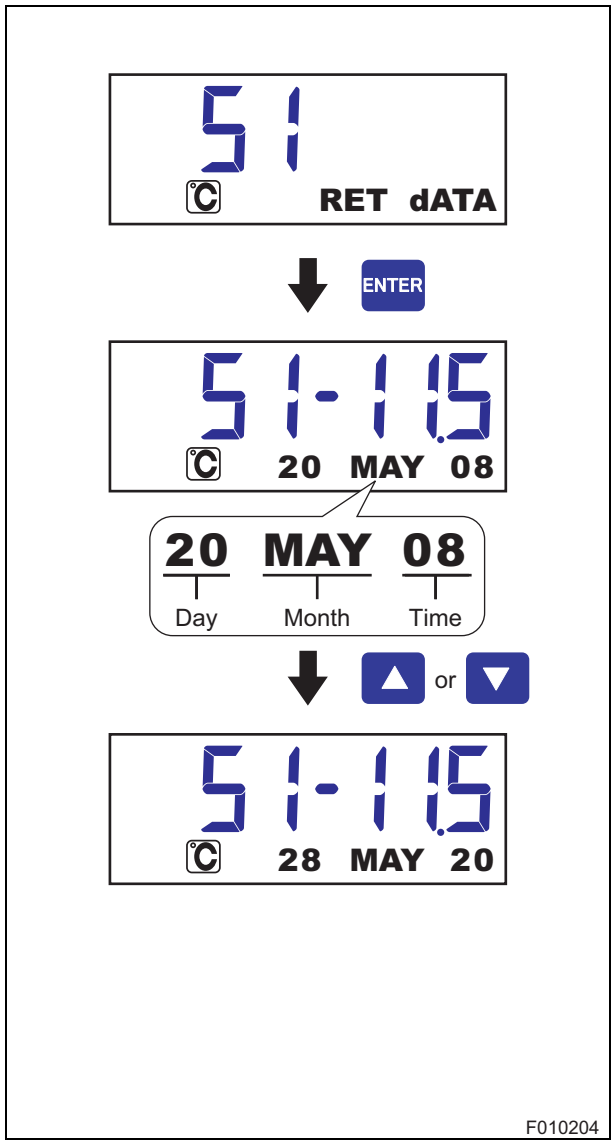
• Display the supply air temperature log data.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "50."
3) Press ENTER to show the supply air temperature log data as the measured value, and the log entry date on the sub-display.
4) Use the ▲ or ▼ switch to toggle between log entry dates.

(48) Return Air Temperature Log Data Display

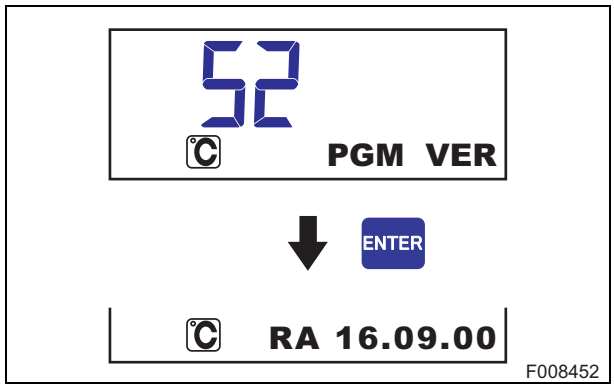
- Display the return air temperature log data.



1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "51."
3) Press ENTER to show the return air temperature log data as the measured value, and the log entry date on the sub-display.
4) Use the ▲ or ▼ switch to toggle between log entry dates.

(49) Program Version Display

- Display the present program version.

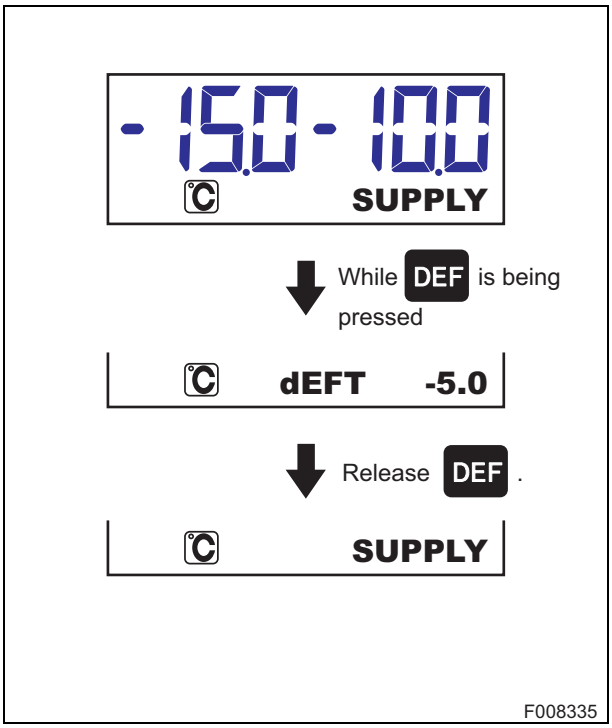


1) Press DATA to display "01."
2) Use the ▲ or ▼ switch to display "52."
3) Press ENTER to show the program version on the sub-display.

4.11 Defrost Operation

(1) Defrost Temperature Display

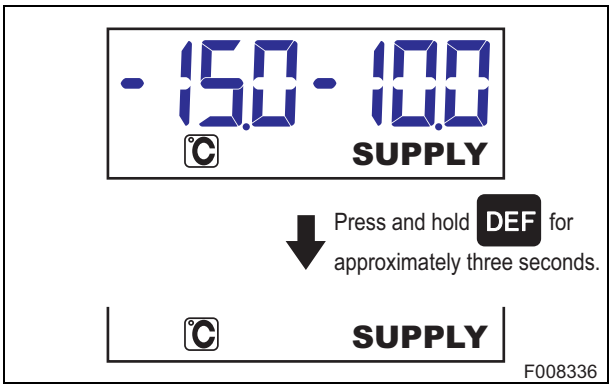
• Display the defrost temperature during defrost operation.



1) Press DEF during defrost operation.
   The defrost temperature (°C) will appear while DEF is pressed.
2) Release DEF to return to the normal display.

(2) Manual Defrost Operation

• Manually start defrost operation.

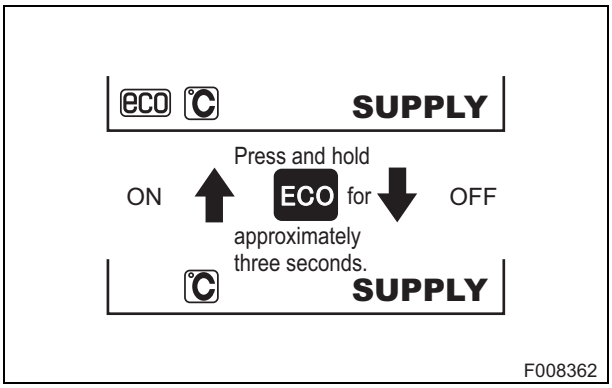


1) To start defrost operation, press DEF for approximately three seconds during frozen or chilled operation.
2) Defrost operation stops automatically.

4.12 Eco-Mode Operation

(1) Eco-Mode Setting

• Set the eco-mode.



1) Press ECO for approximately three seconds during the normal display mode.
When the "ECO" display illuminates, the system is in eco-mode.

4.13 PTI Mode Item List

- Modes to check device operation when leaving port, etc.

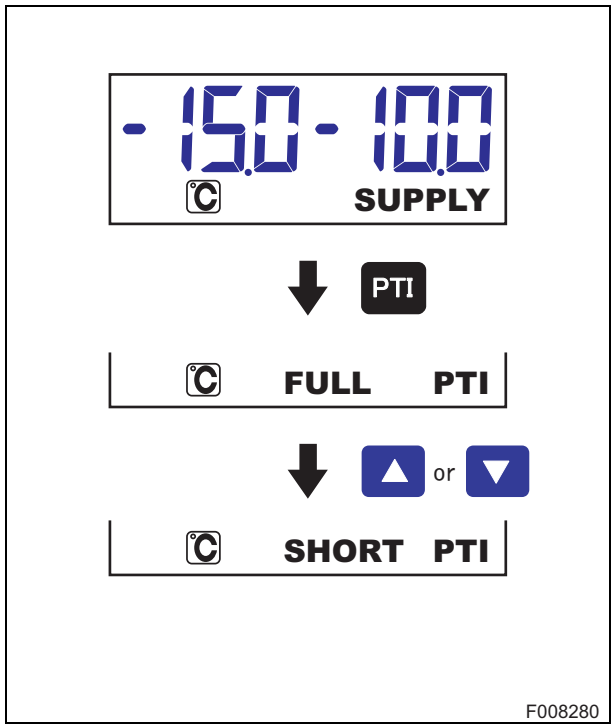
PTI Mode		Step	Item
Full	Short	1	PTI mode preparation
		2	Alarm check
		3	Heater energization check
		4	Heater contactor weld check
		5	Condenser fan motor energization check
		6	Condenser fan motor contactor weld check
		7	Cooling fan motor high-speed energization check
		8	Cooling fan motor high-speed contactor weld check
		9	Cooling fan motor low-speed energization check
		10	Cooling fan motor low-speed contactor weld check
		11	Pressure sensor check
		12	Economizer outlet sensor accuracy check
		13	Economizer expansion valve operation check
		14	Return air temperature sensor, air outlet temperature sensor accuracy check
		15	Evaporator outlet temperature sensor accuracy check
		16	Spare sensor accuracy check
		17	Evaporator expansion valve open-close check
		18	Compressor energization check
		19	• Compressor contactor weld check • PTI short mode completion
	-	20	Chilled heating check
		21	Chilled cooldown check
		22	Chilled temperature fluctuation check
		23	Defrost check
		24	Frozen cooldown operation
		25	Low pressure sensor accuracy check
		26	PTI full mode completion

Item	Description
MANUAL	Individual operation of the high stage compressor
	Individual operation of the low stage compressor
	Individual operation of the condenser fan motor
	Individual low-speed operation of the cooling fan motor
	Individual high-speed operation of the cooling fan motor
	Individual operation of the evaporator expansion valve
	Individual operation of the economizer expansion valve
	Individual heater operation
DATA	Information display menu content check
P/S TEST	Not used

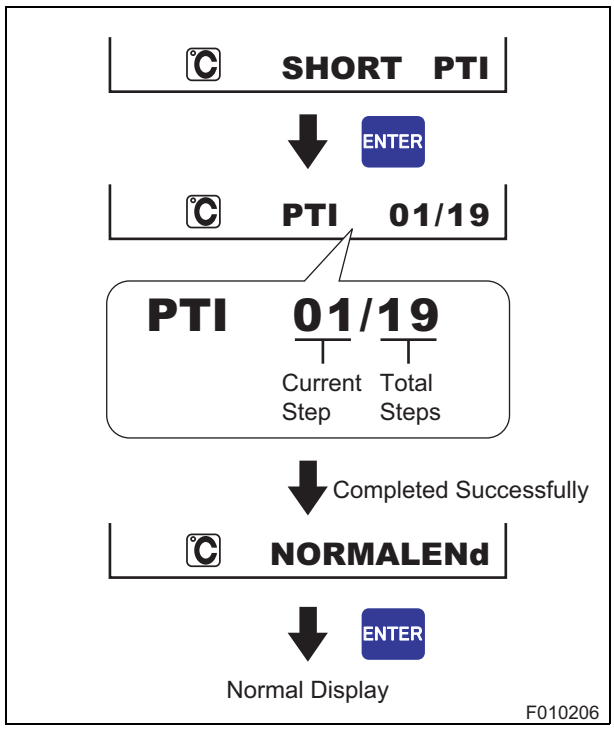
4.14 PTI Mode Operation

(1) SHORT PTI Operation

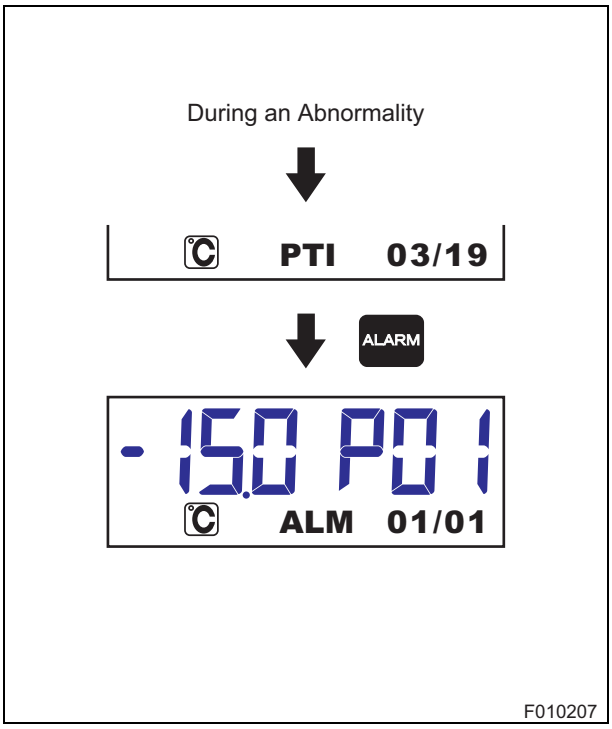
- Initiate SHORT PTI operation.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST



3) When "SHORT PTI" displays, press ENTER to start the SHORT PTI mode.
   The "Step" is displayed during SHORT PTI.
4) When PTI is completed successfully and "NORMAL-ENd" is displayed, press ENTER to return to the normal display (normal operation).

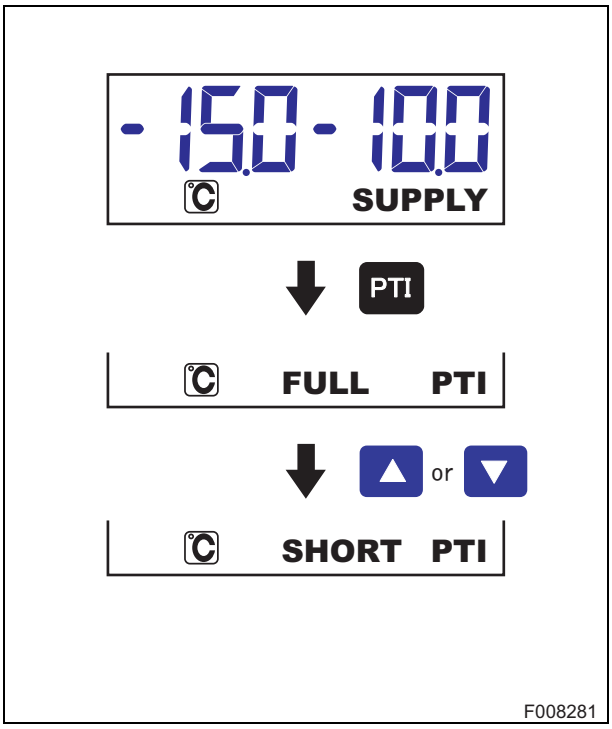


5) When there is an abnormality, the "Step" in which the abnormality occurred and the alarm code number will display.

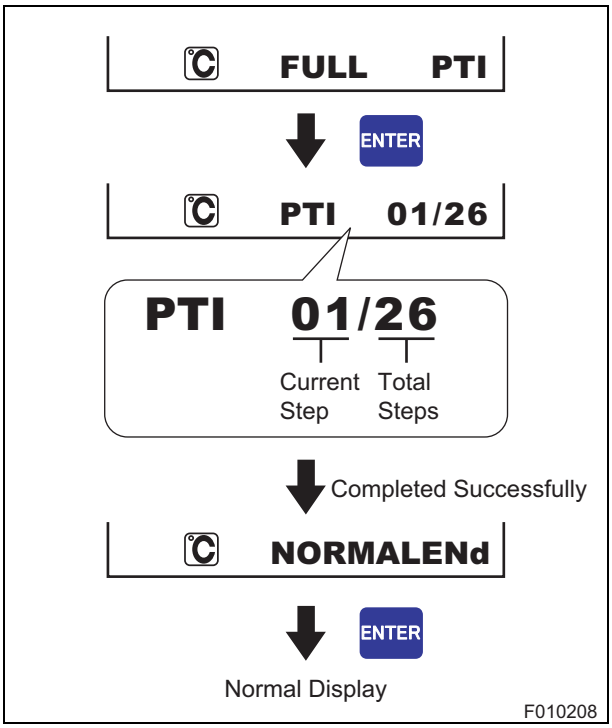
6) Turn the power supply OFF during an abnormality. The PTI mode is now concluded.

(2) FULL PTI Operation

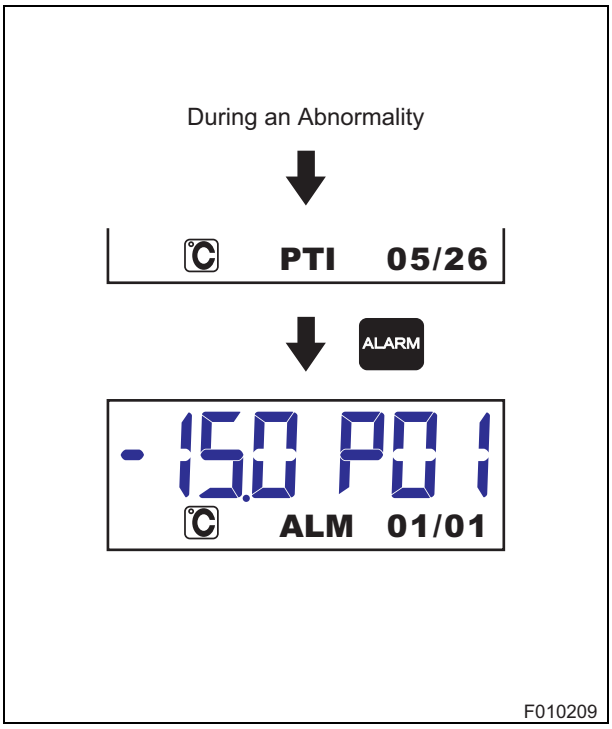
- Initiate FULL PTI operation.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST



3) When "FULL PTI" displays, press ENTER to start the FULL PTI mode.
   The "Step" is displayed during FULL PTI.
4) When PTI is completed successfully and "NORMAL-ENd" is displayed, press ENTER to return to the normal display (normal operation).



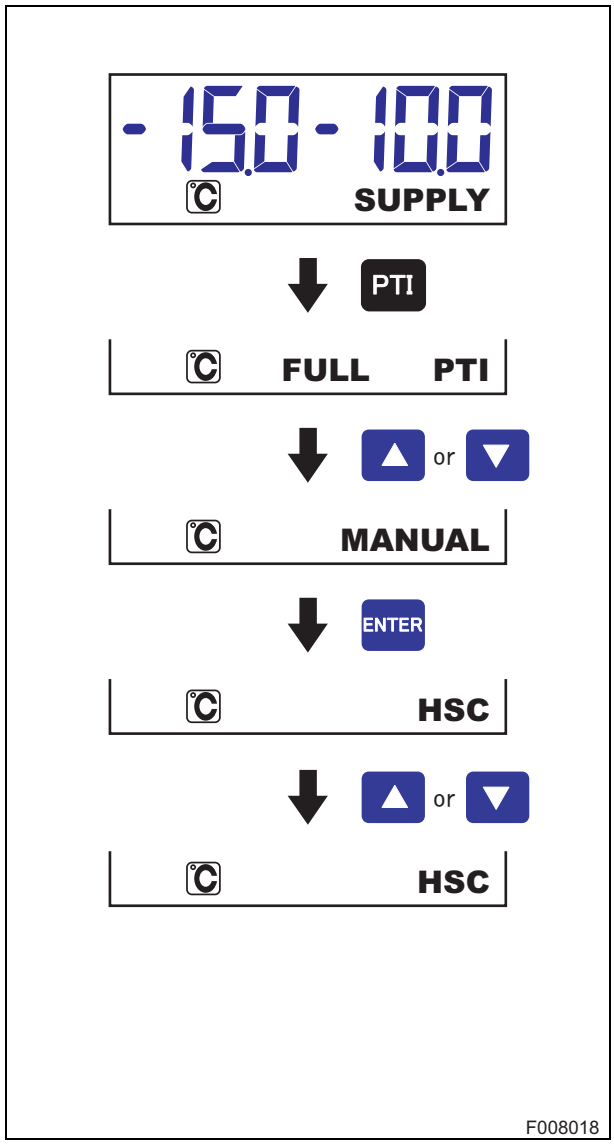
5) When there is an abnormality, the "Step" in which the abnormality occurred and the alarm code number will display.

6) Turn the power supply OFF during an abnormality. The PTI mode is now concluded.

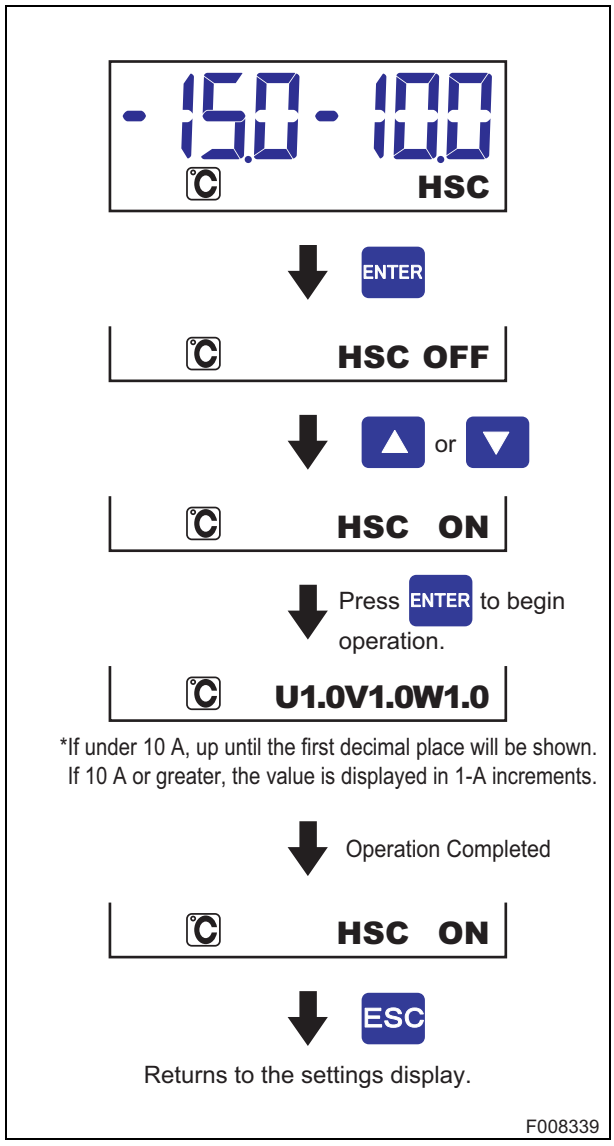
4.15 Manual Defrost Operation

(1) Individual Operation of the High Stage Compressor

• Operate the high stage compressor individually for approximately 10 seconds (increase the rotational speed by 2 rps/sec).



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



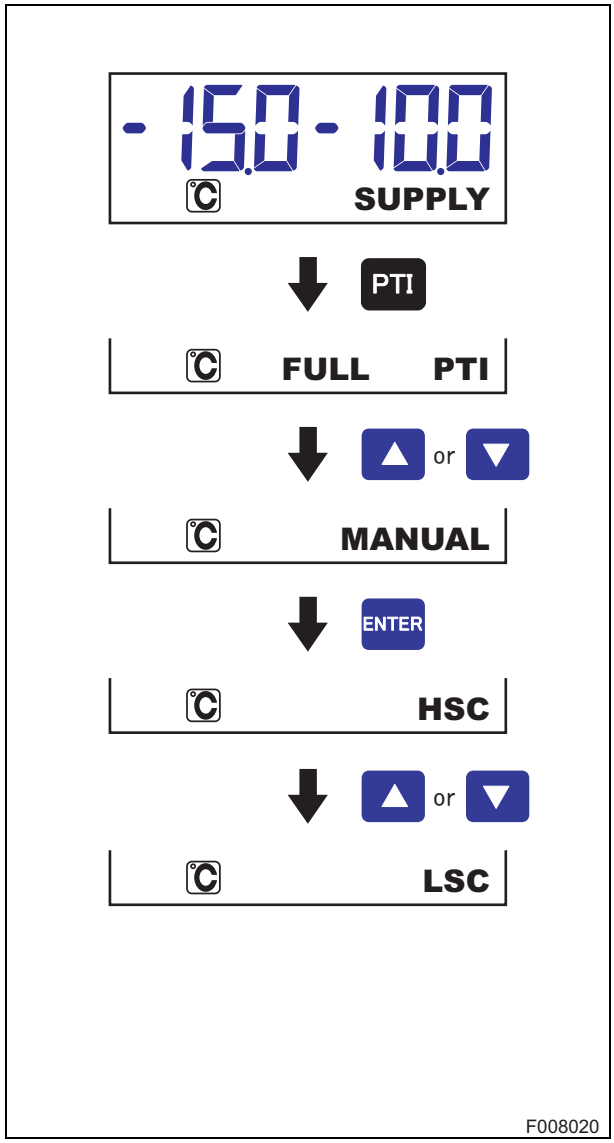
5) When "HSC" displays, press ENTER.

6) Use the ▲ or ▼ switch to select "HSC ON", and then press ENTER to start individual high stage compressor operation.
   During operation, the present current value is displayed.

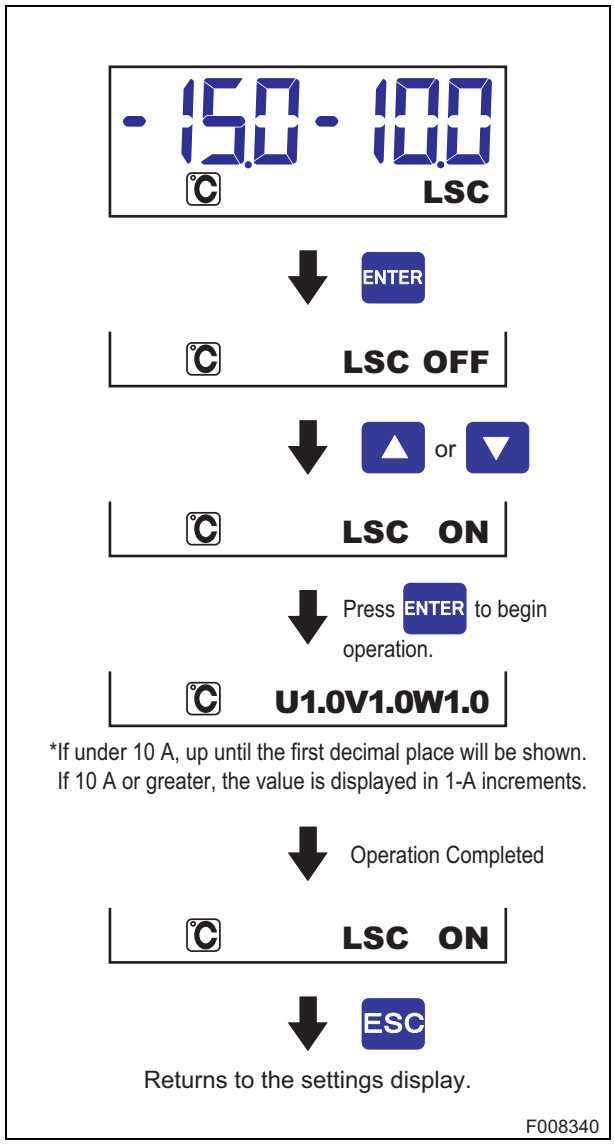
7) When operation is complete, the system returns to the individual operation setting for the high stage compressor.
   To operate other components, press ESC several times to return to the setting display.

(2) Individual Operation of the Low Stage Compressor

• Operate the low stage compressor individually for approximately 10 seconds (increase the rotational speed by 2 rps/sec).



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



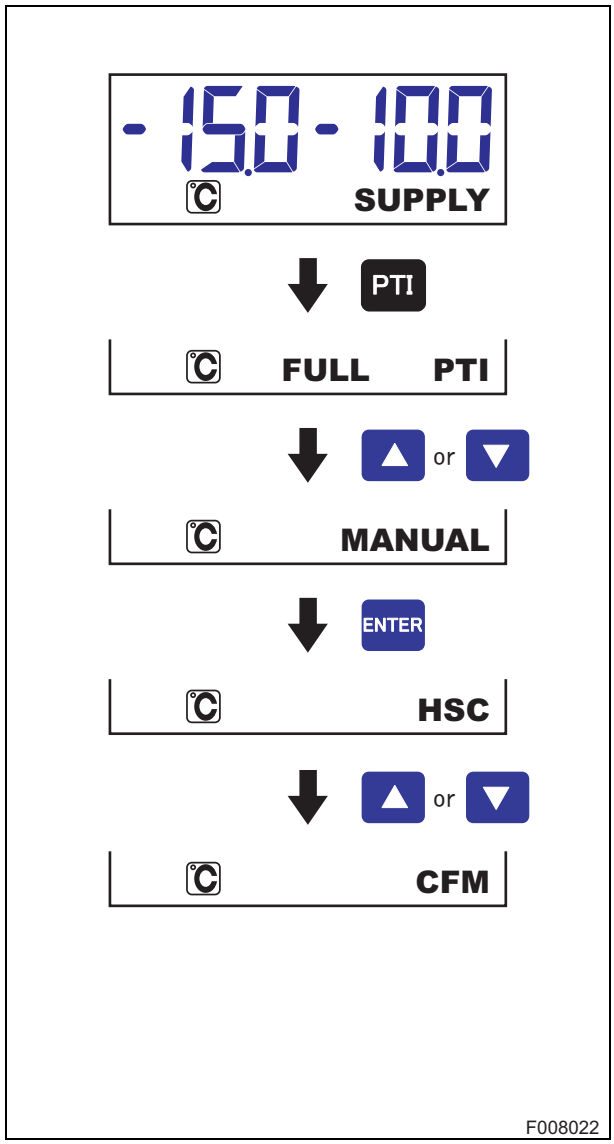
5) When "LSC" displays, press ENTER.

6) Use the ▲ or ▼ switch to select "LSC ON", and then press ENTER to start individual low stage compressor operation.
   During operation, the present current value is displayed.

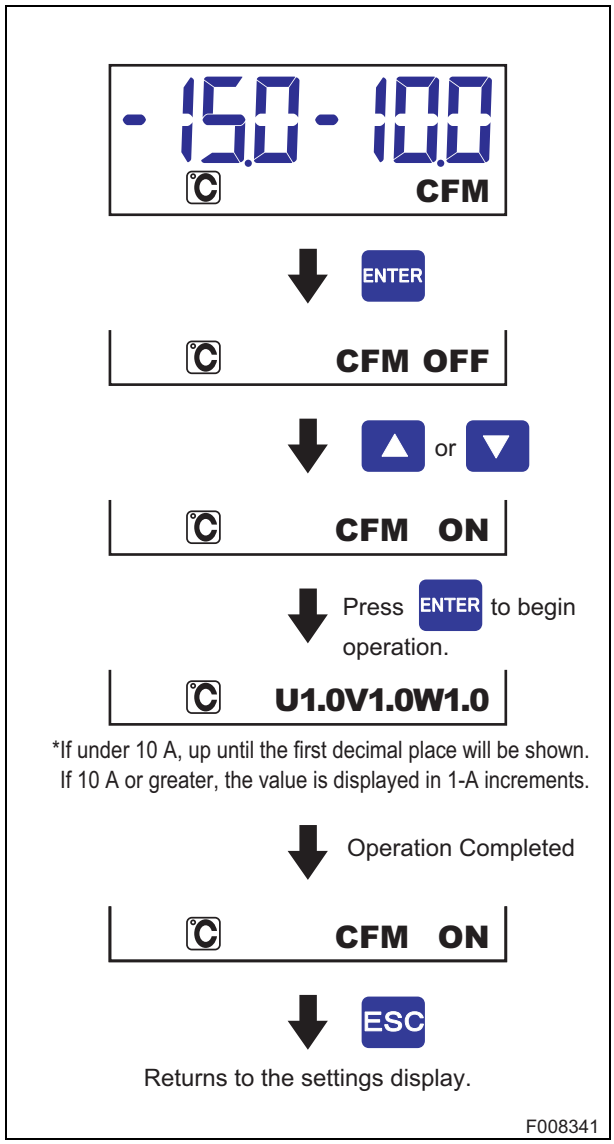
7) When operation is complete, the system returns to the individual operation setting for the low stage compressor.
   To operate other components, press ESC several times to return to the setting display.

(3) Individual Operation of the Condenser Fan Motor

- Operate the condenser fan motor individually for approximately 60 seconds.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



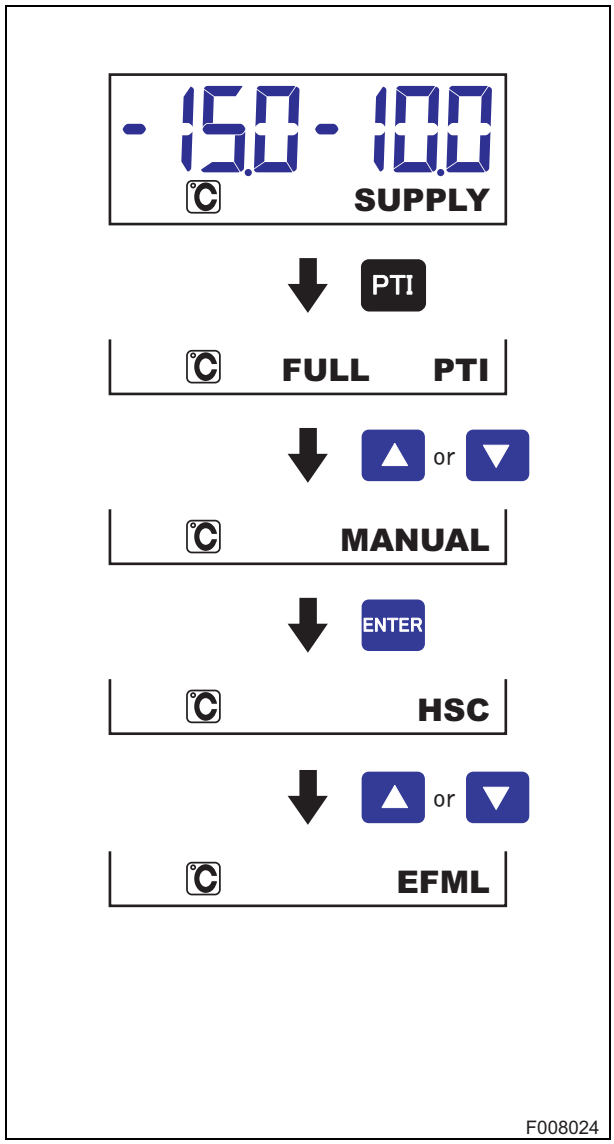
5) When "CFM" displays, press ENTER.

6) Use the ▲ or ▼ switch to select "CFM ON", then press ENTER to start individual condenser fan motor operation.
   During operation, the present current value is displayed.

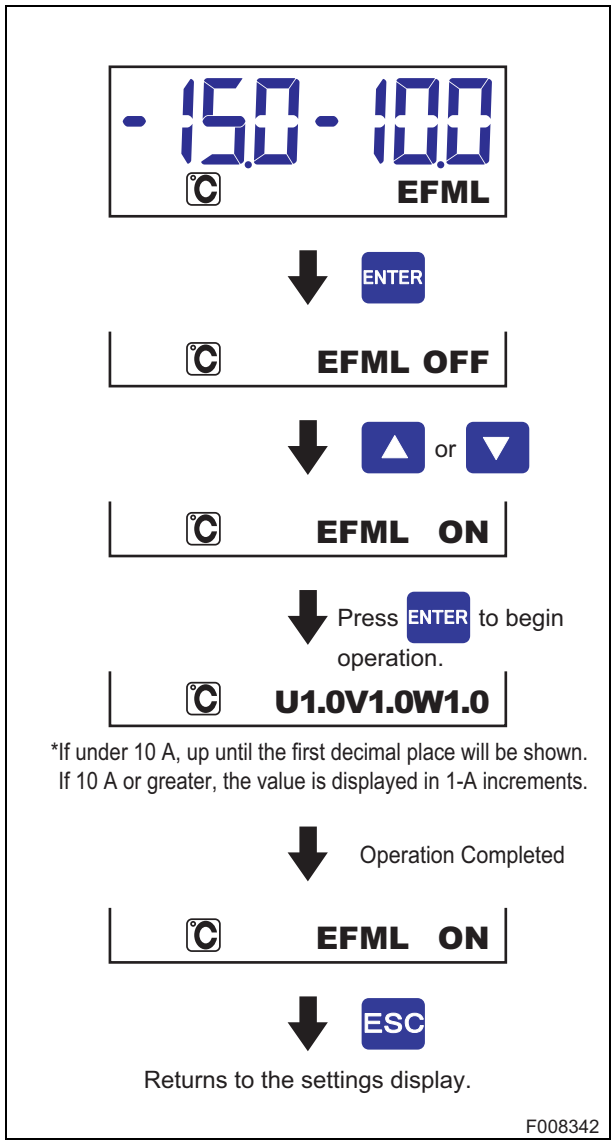
7) When operation is complete, the system returns to the individual operation setting for the condenser fan motor.
   To operate other components, press ESC several times to return to the setting display.

(4) Individual Low-Speed Operation of the Cooling Fan Motor

• Operate the cooling fan motor individually at low speed for approximately 300 seconds.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



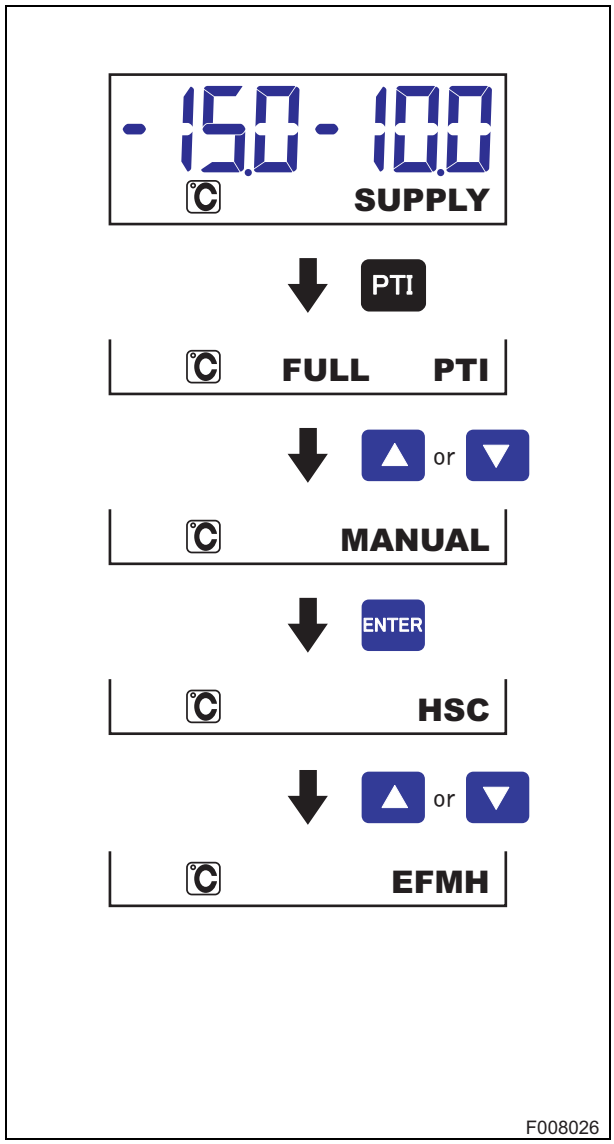
5) When "EFML" displays, press ENTER.

6) Use the ▲ or ▼ switch to select "EFML ON", then press ENTER to start individual low-speed operation of the cooling fan motor.
   During operation, the present current value is displayed.

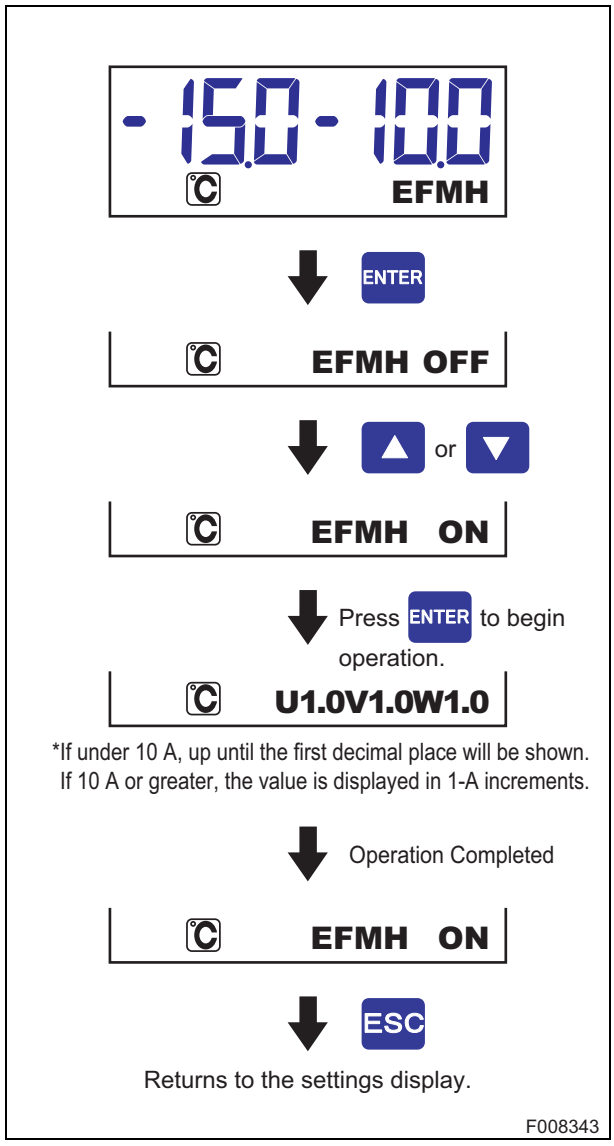
7) When operation is complete, the system returns to the individual low speed operation setting for the cooling fan motor.
   To operate other components, press ESC several times to return to the setting display.

(5) Individual High-Speed Operation of the Cooling Fan Motor

• Operate the cooling fan motor individually at high speed for approximately 300 seconds.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



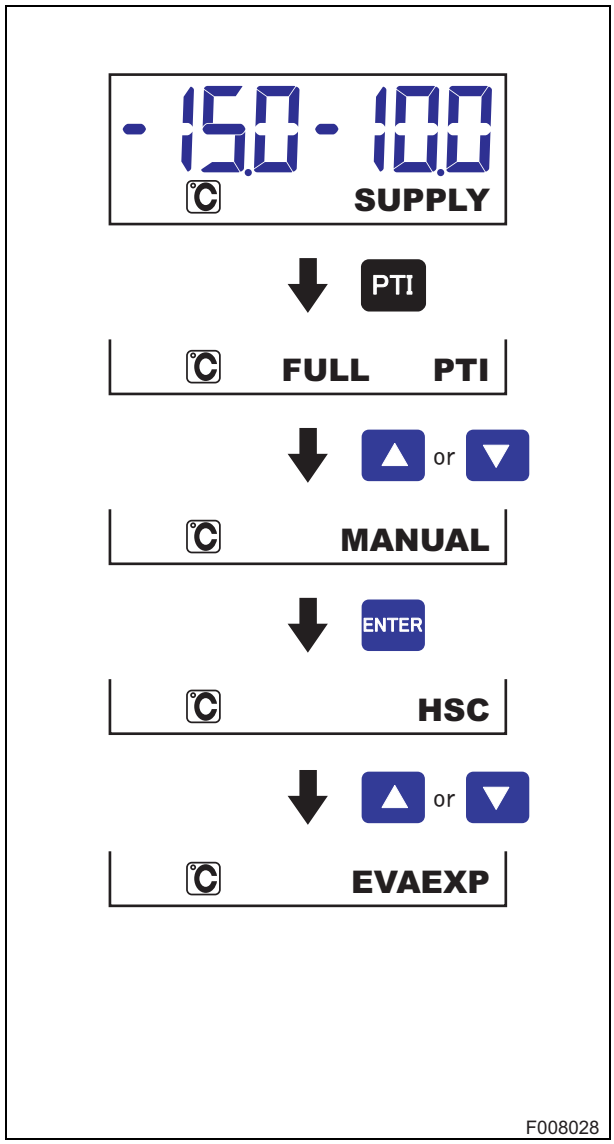
5) When "EFMH" displays, press ENTER.

6) Use the ▲ or ▼ switch to select "EFMH ON", then press ENTER to start individual high-speed operation of the cooling fan motor.
   During operation, the present current value is displayed.

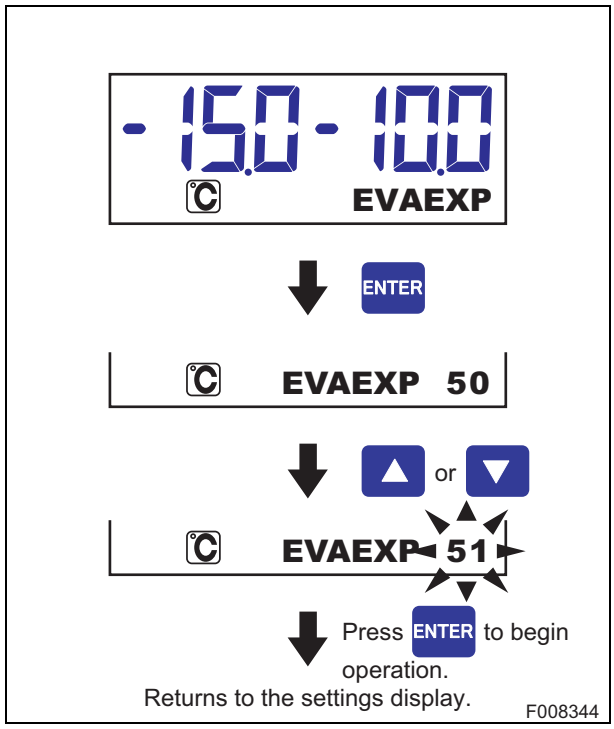
7) When operation is complete, the system returns to the individual high speed operation setting for the cooling fan motor.
   To operate other components, press ESC several times to return to the setting display.

(6) Individual Operation of the Evaporator Expansion Valve

- Operate the evaporator expansion valve individually.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



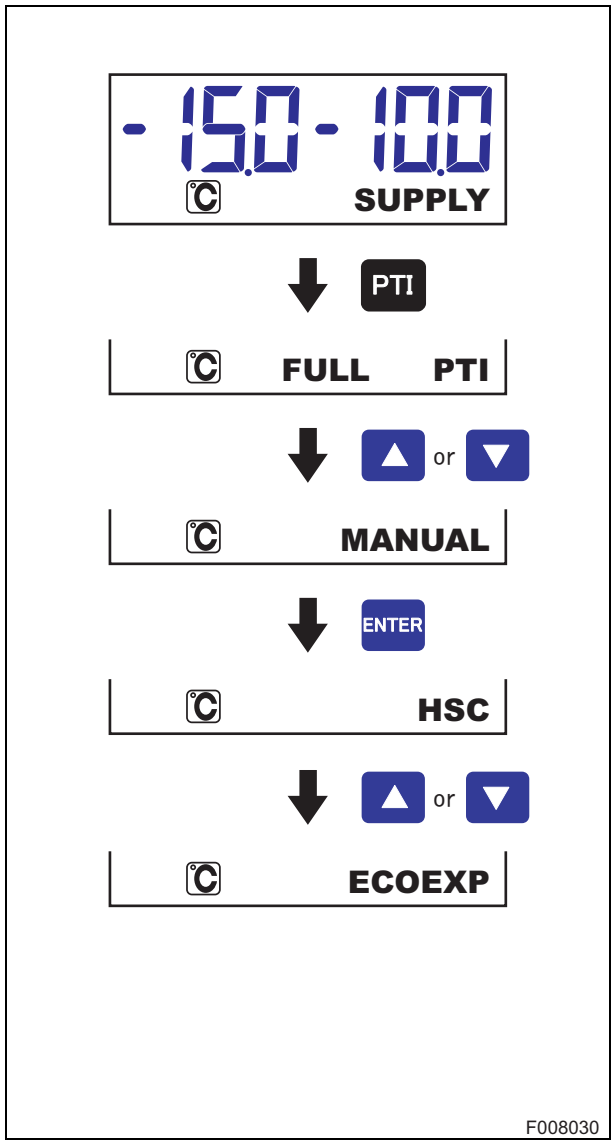
5) When "EVAEXP" displays, press ENTER to display the evaporator expansion valve opening (%).

6) Use the ▲ or ▼ switch to change the evaporator expansion valve opening (%).
Press and hold either switch to cycle through the digits successively.

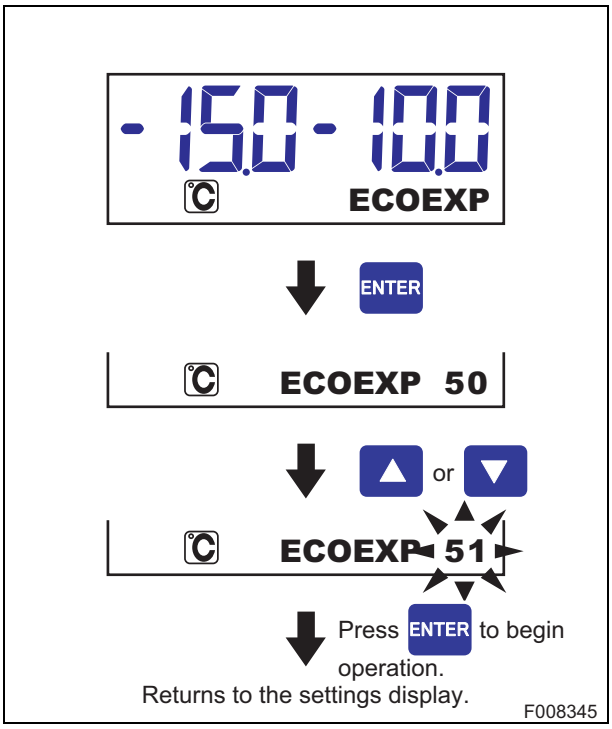
7) Press ENTER to start individual evaporator expansion valve operation.
When operation is complete, the system returns to the original settings.

(7) Individual Operation of the Economizer Expansion Valve

- Operate the economizer expansion valve individually.



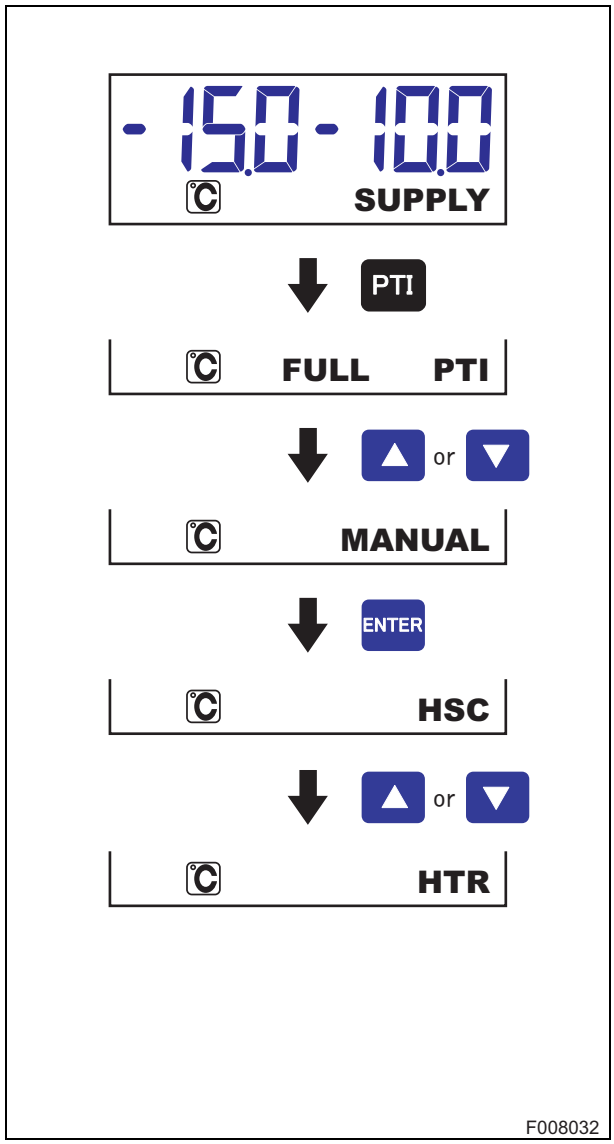
1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



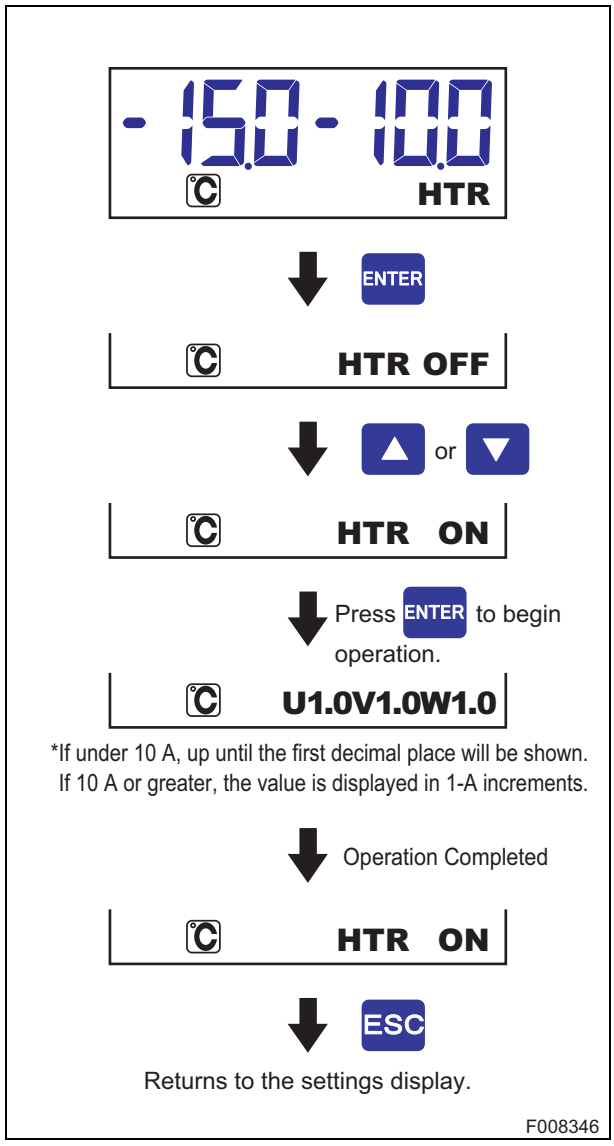
5) When "ECOEXP" displays, press ENTER to display the economizer expansion valve opening (%).
6) Use the ▲ or ▼ switch to change the economizer expansion valve opening (%).
   Press and hold either switch to cycle through the digits successively.
7) Press ENTER to start individual economizer expansion valve operation.
   When operation is complete, the system returns to the original settings.

(8) Individual Heater Operation

- Operate the heater individually for approximately 300 seconds.



1) Press PTI during the normal display mode.
2) Press the ▲ or ▼ switch to select the PTI mode.
   Modes: FULL PTI, SHORT PTI, MANUAL, DATA, P/S TEST
3) When "MANUAL" displays, press ENTER.
4) Use the ▲ or ▼ switch to select the component to manually operate.
   Set values: HSC, LSC, CFM, EFML, EFMH, EVAEXP, ECOEXP, HTR



5) When "HTR" displays, press ENTER.

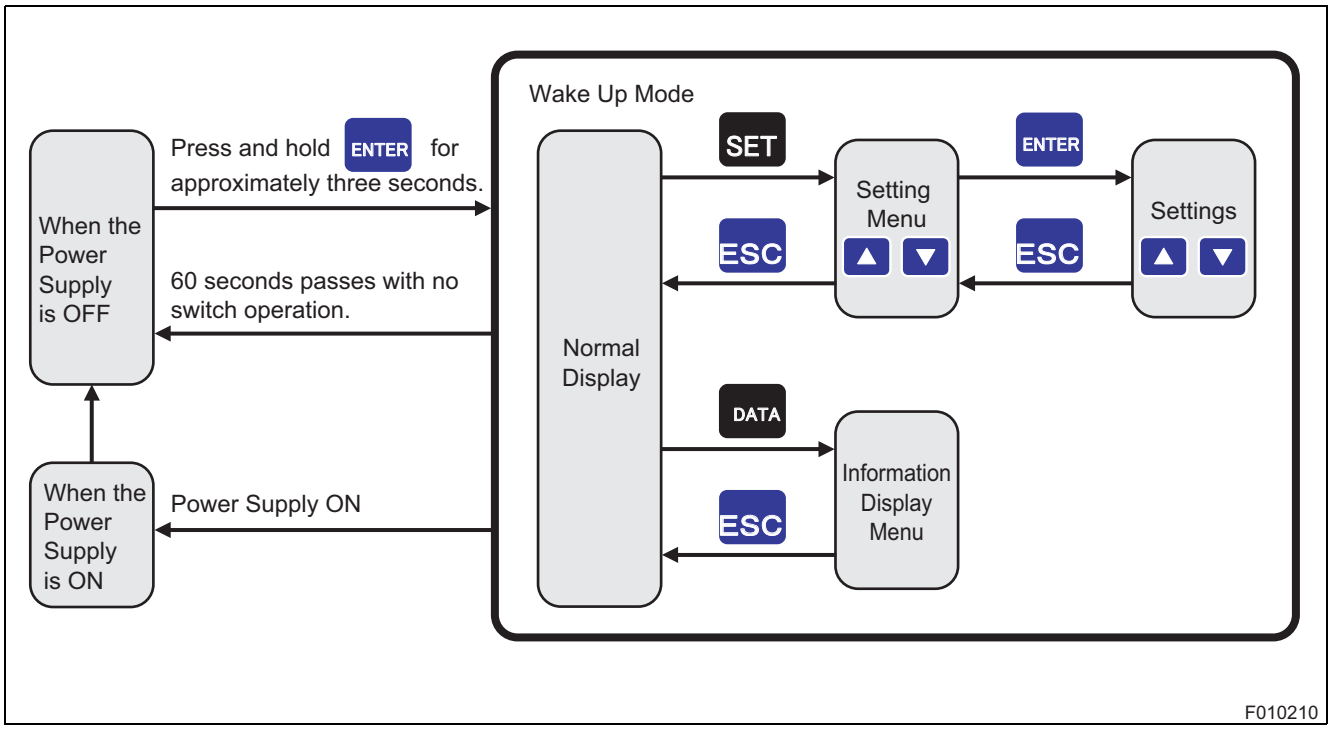
6) Use the ▲ or ▼ switch to select "HTR ON", then press ENTER to start individual heater operation.
During operation, the present current value is displayed.

7) When operation is complete, the system returns to the individual operation setting for the heater.
To operate other components, press ESC several times to return to the setting display.

4.16 Wake Up Mode Operation

Wake Up Mode Operation

- When the power supply is OFF, a battery built into the transport refrigerator enables a portion of the setting menus to be changed and the information display menus to be checked.
  In addition, a service tool can be used via a PC connection to download various data types.
  - Press ENTER for approximately three seconds to transition to the Wake Up Mode.
  - The operation methods for the setting menus and information display menus are the same as for normal operation.



4.17 Wake Up Mode Item List

(1) Setting Menu

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
1	Set temperature change	S01	-	STCHG	P1-23
2	Switching between Celsius and Fahrenheit	S02	-	C/FCHG	P1-23
3	Defrost interval change	S03	-	dEFTCHG	P1-24
4	Sensor logging interval change	S05	-	LOGICHG	P1-24
5	Dehumidification operation	S06	-	dEHCHG	P1-25
6	Set humidity change	S07	-	SHCHG	P1-25
7	Defrost completion temperature change	S08	-	dEFTTCHG	P1-26
8	Current limit	S09	-	AMPLCHG	P1-26
9	Battery check	S10	-	bATCHK	P1-27

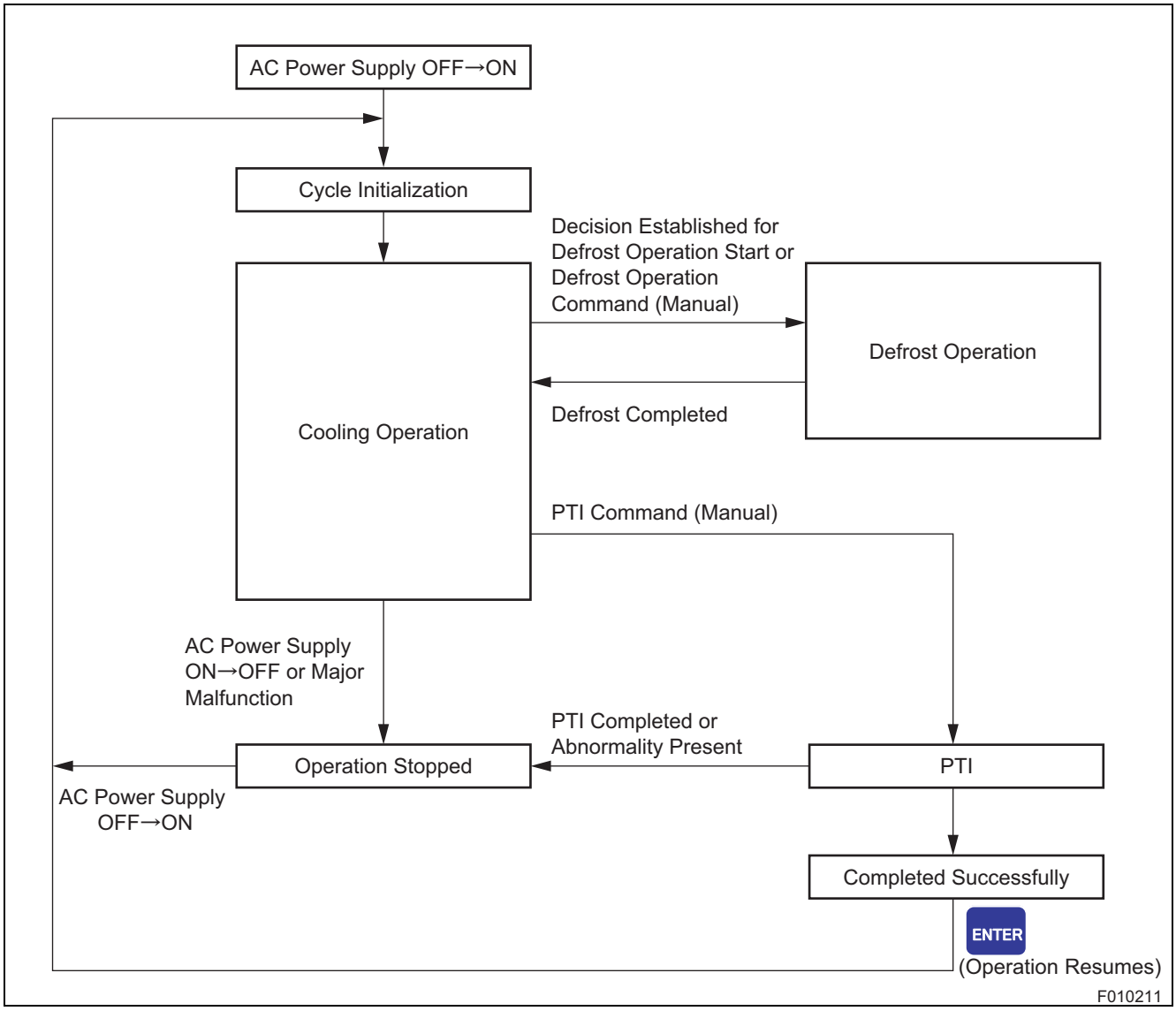
(2) Information Display Menu

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
1	Return air temperature 1	01	***.*	RET1	P1-39
2	Supply air temperature 1	02	***.*	SUP1	P1-39
3	Ambient temperature 1	03	***.*	AMb1	P1-39
4	USDA1 temperature	04	***.*	USdA1	P1-40
5	USDA2 temperature	05	***.*	USdA2	P1-40
6	USDA3 temperature	06	***.*	USdA3	P1-40
7	Cargo temperature	07	***.*	CARGO	P1-41
8	Relative humidity	08	***	RETRH	P1-41
9	Ventilation flow volume	09	***	VENT	P1-41
10	Return air temperature 2	10	***.*	RET2	P1-42
11	Supply air temperature 2	11	***.*	SUP2	P1-42
12	Ambient temperature 2	12	***.*	AMb2	P1-42
13	Defrost temperature	13	***.*	dEFT	P1-43
14	High stage compressor discharge temperature	14	***.*	HSCdT	P1-43
15	High stage compressor body temperature	16	***.*	HSCbT	P1-43
16	Low stage compressor suction temperature	18	***.*	LSCST	P1-44
17	Low stage compressor body temperature	19	***.*	LSCbT	P1-44
18	Evaporator inlet temperature	20	***.*	EI	P1-44
19	Evaporator outlet temperature	21	***.*	EO	P1-45
20	Economizer inlet temperature	22	***.*	ECI	P1-45
21	Economizer outlet temperature	23	***.*	ECO	P1-45
22	High pressure	24	-	HP ****	P1-46
23	Middle pressure	25	-	MP ****	P1-46
24	Low pressure	26	-	LP ****	P1-46
25	High stage compressor current	27	**.*	HSCC	P1-47
26	Low stage compressor current	28	**.*	LSCC	P1-47
27	High stage inverter frequency display	29	***	HSIF	P1-47
28	Low stage inverter frequency display	30	***	LSIF	P1-48
29	High stage inverter temperature	31	***	HSIT	P1-48
30	Low stage inverter temperature	32	***	LSIT	P1-48
31	Evaporator expansion valve opening	33	***	EVA EXP	P1-49
32	Economizer expansion valve opening	34	***	ECO EXP	P1-49
33	Cooling fan status	35	***	EFM	P1-49
34	Main power supply voltage	37	***	VOL	P1-50
35	Main power supply U-phase current	38	**.*	L1	P1-50

No.	Setting Description	Set Value	Measured Value	Sub-Display	Reference Page
36	Main power supply V-phase current	39	**.*	L2	P1-50
37	Main power supply W-phase current	40	**.*	L3	P1-51
38	Main power supply frequency	41	**	HZ	P1-51
39	High stage compressor operating time	42	-	HSCRHR	P1-51
40	Low stage compressor operating time	43	-	LSCRHR	P1-52
41	Cooling fan motor 1 (right side) operating time	44	-	EFMRRHR	P1-52
42	Cooling fan motor 2 (left side) operating time	45	-	EFMLRHR	P1-52
43	Condenser fan motor operating time	46	-	CFMRHR	P1-53
44	Heater operating time	47	-	HTRHR	P1-53
45	High stage inverter operating time	48	-	HSIRHR	P1-53
46	Low stage inverter operating time	49	-	LSIRHR	P1-54
47	Supply air temperature log data	50	-	SUP dATA	P1-54
48	Return air temperature log data	51	-	RET dATA	P1-55
49	Program version	52	-	PGM VER	P1-55

5. Explanation of Controls

5.1 Transitioning Between Operating States



5.2 Cooling Operation

- Chilled operation is divided into chilled operation and frozen operation in accordance with the set temperature.
  When the set temperature is -10°C or higher, the system runs in chilled mode; when the set temperature is lower than -10°C, the system runs in frozen mode.
  During cooling operation the temperature inside the container is adjusted by changing the compressor rotational speed, and turning the heater ON and OFF.

(1) Chilled Operation

- When the set temperature is -10°C or higher, the system runs in chilled mode.
- In chilled mode, the cooling fan operates at high speed.
  (During Eco mode, the cooling fan will operate at low speed.)
- In chilled mode, the compressor rotational speed is regulated to adjust the air outlet temperature to the set temperature.
  When there is a danger of supercooling, the thermistor turns OFF (compressor stops), and the heater is energized to start heating operation.
- The condenser fan and each expansion valve are optimally controlled.
- When a humidity sensor (optional) is installed, humidification operation (S06) is turned ON, and humidification operation is conducted in accordance with the set humidity (S07).

(2) Frozen Operation

- When the set temperature is lower than -10°C, the system runs in frozen mode.
- In frozen mode, the cooling fan operates at low speed.
- In frozen mode, the compressor rotational speed is regulated to adjust the return air temperature to the set temperature.
  When there is a danger of supercooling, the thermistor turns OFF (compressor stops), and the cooling fan is switched to high-speed operation.
- The condenser fan and each expansion valve are optimally controlled.
- Humidification operation cannot be set when in frozen mode.

5.3 Defrost Operation

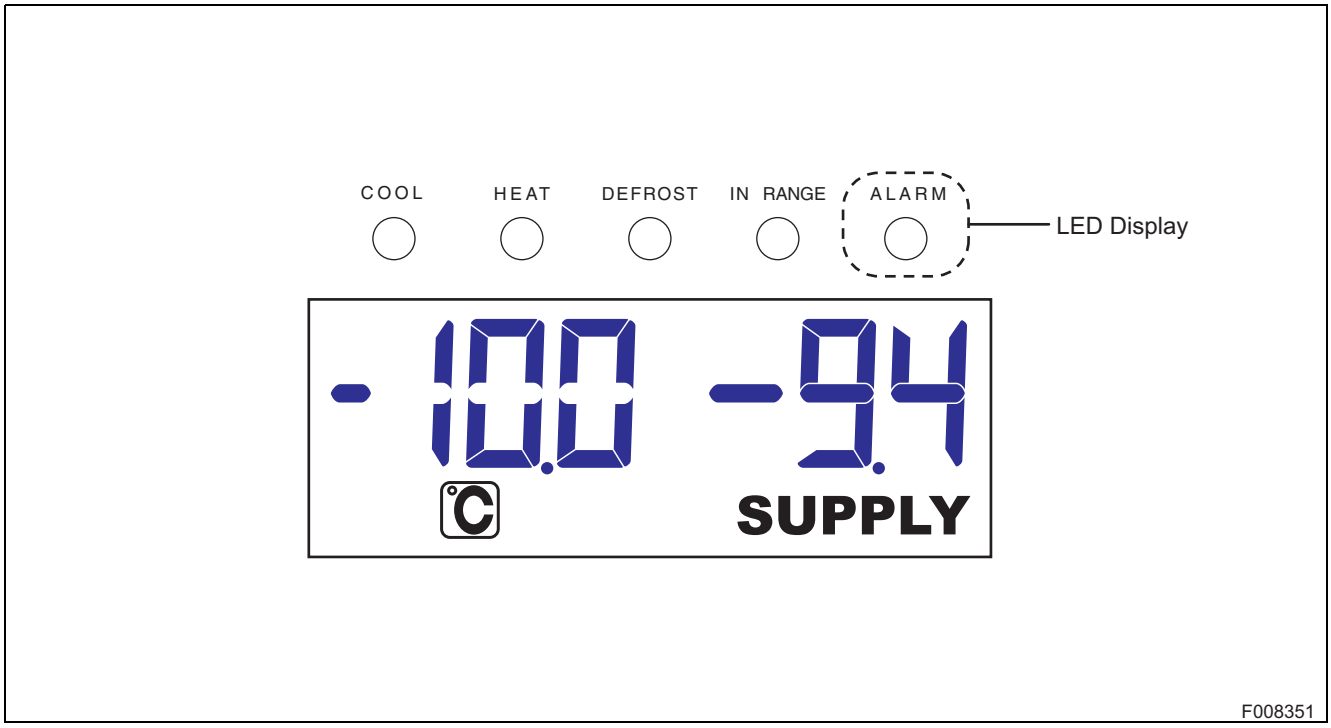
- Defrost operation starts when the defrost interval set for the defrost timer is reached.
- During defrost operation the compressor, cooling fan, and condenser fan are stopped.
- The heater is energized to heat the evaporator and melt any frost.
- Defrost operation is completed when the defrost stop sensor reaches the set stop temperature, or when 90 minutes have elapsed since defrost operation began.
- After defrost operation is completed, cold insulation operation (cooling operation with the cooling fan stopped) is initiated to start cooling operation.

6. Alarm Code Display and Operation During and Abnormality

6.1 Alarm Code Display

- Alarm codes are divided into "abnormal operation codes" that require the applicable component to be stopped and repaired, and "backup operation codes", under which continued transport refrigerator operation is possible.

Code	Component Status	Malfunction Level	LED Display
Abnormal Operation Code	Component stops	Serious malfunction	Flashing
Backup Operation Code	Continued operation at a substitute value	Serious malfunction	Flashing
		Minor malfunction	Illuminated or Extinguished



6.2 Alarm Code List

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
A01	High stage compressor discharge temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A03	High stage compressor body temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A05	Low stage compressor inlet temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A06	Low stage compressor body temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A07	Ambient temperature sensor 1 open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A08	Return temperature sensor 1 open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A09	Supply air temperature sensor 1 open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A10	Evaporator inlet temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A11	Evaporator outlet temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A12	Economizer inlet temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A13	Economizer outlet temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A14	Defrost temperature sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A15	High pressure sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
A16	Middle pressure sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A17	Low pressure sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A18	Current sensor U open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A19	Current sensor V open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A20	Current sensor W open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A21	USDA #1 sensor open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A22	USDA #2 sensor open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A23	USDA #3 sensor open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A24	Cargo sensor open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A25	Ambient temperature sensor 2 open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A26	Return temperature sensor 2 open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A27	Supply air temperature sensor 2 open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
A28	Humidity sensor open circuit or short circuit	Back-up operation	Lit	When the sensor value reverts to the normal value.
A29	Ambient air temperature differential abnormality	Normal operation	Lit	When the sensor value reverts to the normal value.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
A30	Return air temperature differential abnormality	Normal operation	Lit	When the sensor value reverts to the normal value.
A31	Supply air temperature differential abnormality	Normal operation	Lit	When the sensor value reverts to the normal value.
A32	Low pressure sensor accuracy abnormality	Normal operation	Lit	When the sensor value reverts to the normal value.
A33	Vent position sensor open circuit or short circuit	Normal operation	Lit	When the sensor value reverts to the normal value.
B01	High stage compressor discharge temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high stage compressor discharge temperature reverts to the normal value.
B02	High stage compressor body temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high stage compressor body temperature reverts to the normal value.
		Perpetually stopped	Flashing	When the power supply is OFF.
B03	Low stage compressor discharge temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low stage compressor discharge temperature reverts to the normal value.
B04	Low stage compressor body temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low stage compressor body temperature reverts to the normal value.
		Perpetually stopped	Flashing	When the power supply is OFF.
B05	Inverter contactor abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When voltage is applied to the inverter contactor coil during an inverter contactor operation command.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
B06	High stage compressor discharge pressure abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high pressure sensor value reverts to the normal value.
		Perpetually stopped	Flashing	When the power supply is OFF.
B07	Low stage compressor suction pressure abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low pressure sensor value reverts to the normal value.
		Perpetually stopped	Flashing	When the power supply is OFF.
B08	Cooling fan contactor abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When voltage is applied to the cooling fan contactor coil during a cooling fan contactor operation command.
		Perpetually stopped	Flashing	When the power supply is OFF.
B09	Condenser fan motor contactor abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When voltage is applied to the condenser fan motor contactor coil during a condenser fan motor contactor operation command.
		Perpetually stopped	Flashing	When the power supply is OFF.
B10	Heater contactor abnormality	Only active when turned ON as an optional selection.	Lit	When voltage is applied to the heater contactor coil during a heater contactor operation command.
		Perpetually stopped	Flashing	When the power supply is OFF.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
B11	Out-of-range	Normal operation	Lit	When the temperature returns into range, when the set temperature is changed, or when PTI is started.
B12	Set temperature not achieved	Normal operation	Lit	When the temperature returns into range, when the set temperature is changed, or when PTI is started.
B13	Insufficient refrigeration capacity	Normal operation	Lit	When the difference between the return and supply air temperatures returns to the normal value.
B14	Vent open during frozen operation	Normal operation	Lit	Recovers when the ventilation volume is at or below the normal value.
C01	High stage inverter communication abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Released 40 seconds after the alarm occurs.
		Perpetually stopped	Flashing	When the power supply is OFF.
C02	High stage compressor abnormal rotating torque	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when the power supply is turned OFF or when there is no alarm from the inverter.
C03	High stage inverter power supply line short circuit	Perpetually stopped	Flashing	When the power supply is OFF.
C04	Phase interruption in the high stage inverter output	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
		Perpetually stopped	Flashing	When the power supply is OFF.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
C05	High stage inverter overcurrent	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C06	High stage inverter heat sink high temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the fin temperature reverts to the normal value.
C07	High stage inverter fan abnormality	Perpetually stopped	Flashing	When the power supply is OFF.
C08	High stage inverter motor overload	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C09	High stage inverter overload	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C10	High stage inverter main circuit overvoltage abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high stage inverter voltage reverts to the normal value.
C11	High stage inverter loss of synchronism detection	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C12	High stage inverter main circuit low voltage abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high stage inverter voltage reverts to the normal value.
C13	High stage inverter control power supply abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the high stage inverter voltage reverts to the normal value.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
C14	High stage inverter hardware abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
		Perpetually stopped	Flashing	When the power supply is OFF.
C15	High stage inverter abnormality other than C01 - C14	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C16	Low stage inverter communication abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Released 40 seconds after the alarm occurs.
		Perpetually stopped	Flashing	When the power supply is OFF.
C17	Low stage compressor abnormal rotating torque	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when the power supply is turned OFF or when there is no alarm from the inverter.
C18	Low stage inverter power supply line short circuit	Perpetually stopped	Flashing	When the power supply is OFF.
C19	Phase interruption in the low stage inverter output	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
		Perpetually stopped	Flashing	When the power supply is OFF.
C20	Low stage inverter overcurrent	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.

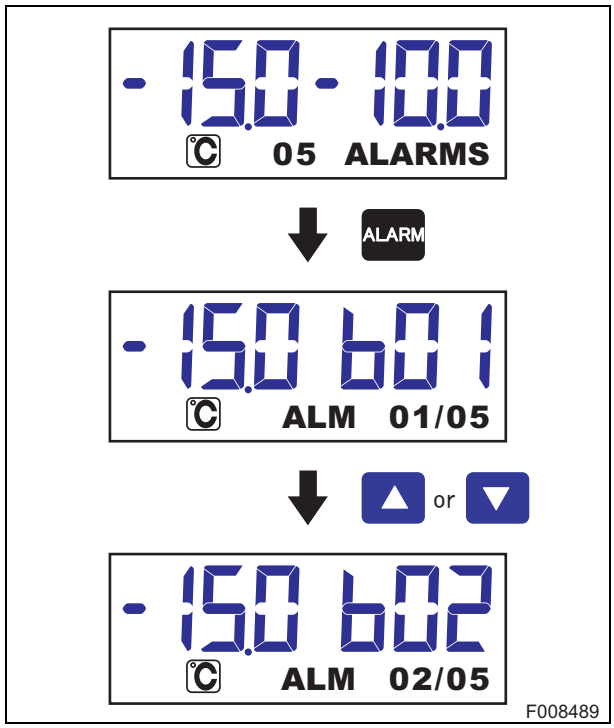
Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
C21	Low stage inverter heat sink high temperature abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the fin temperature reverts to the normal value.
C22	Low stage inverter fan abnormality	Perpetually stopped	Flashing	When the power supply is OFF.
C23	Low stage inverter motor overload	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C24	Low stage inverter overload	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C25	Low stage inverter main circuit overvoltage abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low stage inverter voltage reverts to the normal value.
C26	Low stage inverter loss of synchronism detection	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
C27	Low stage inverter main circuit low voltage abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low stage inverter voltage reverts to the normal value.
C28	Low stage inverter control power supply abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the low stage inverter voltage reverts to the normal value.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
C29	Low stage inverter hardware abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
		Perpetually stopped	Flashing	When the power supply is OFF.
C30	Low stage inverter abnormality other than C16 - C29	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	Recovers when there is no alarm from the inverter.
D01	Power supply low voltage	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the power supply voltage reverts to the normal value.
D02	Abnormal power supply voltage increase	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the power supply voltage reverts to the normal value.
D03	Power supply frequency abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the power supply frequency reverts to the normal value.
D04	Phase cannot be detected	Previous phase sequence is memorized, and operation continues.	Lit	When the power supply is OFF.
D05	Battery disconnected	Operation continues	Lit	When the battery voltage reverts to the normal value.
D06	Control panel abnormality	Key entry is disabled, and operation continues.	Lit	When all key switches are OFF or when the power supply is OFF.
D07	Communication abnormality between the main ECU and the control panel	Key entry is disabled, and operation continues.	Lit	When communication resumes between the main ECU and the control panel.

Code No.	Details of Abnormality	Operation When Abnormality Occurred		Condition for Release
		Operation Details	LED Display	
D11	12-volt power supply abnormality	Normal operation after THERMO OFF and the alarm release conditions are reached (perpetually repeated).	Lit	When the 12-volt power supply voltage reverts to the normal value.
D12	RTC abnormality	Normal operation	Lit	Normally recovers when the time is acquired.
D13	EEPROM abnormality	Operation continues	Lit	When the power supply is OFF.
D14	Flash memory abnormality	Normal operation	Lit	When the power supply is OFF.
D15	ADC abnormality	Perpetually stopped	Flashing	When the power supply is OFF.
E01	Communication abnormality between the panel ECU and the main ECU	Operation continues	Lit	When communication resumes between the panel ECU and the main ECU.

6.3 Method to Display Present Alarms

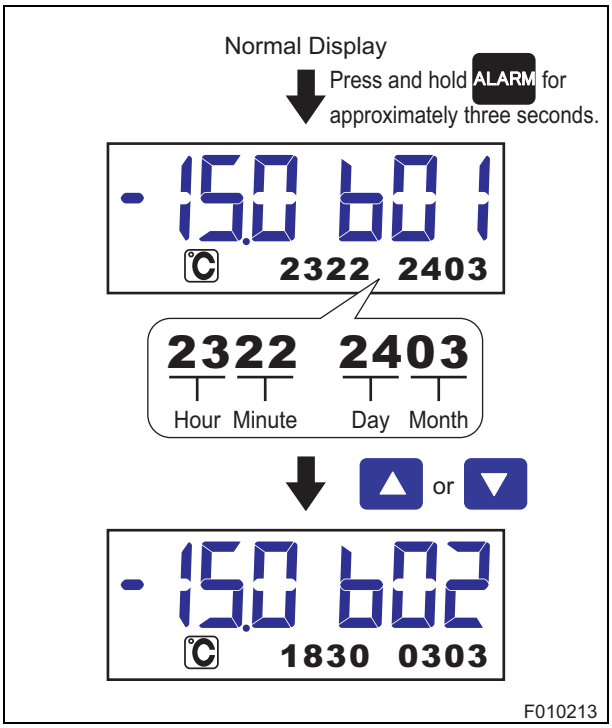
- Display the alarm code(s) when an alarm occurs.



1) When an alarm occurs, press ALARM.
2) The alarm code will appear as the measured value, and the alarm code case number will be shown on the sub-display.
3) When there are two or more alarm code cases, use the ▲ or ▼ switch to display the next alarm code.
   A maximum of ten past alarm code cases can be displayed.

6.4 Method to Display Past Alarms

- Display the alarm code(s) for alarms that have occurred in the past. (When an alarm occurs, the alarm code is recorded as a past alarm.)

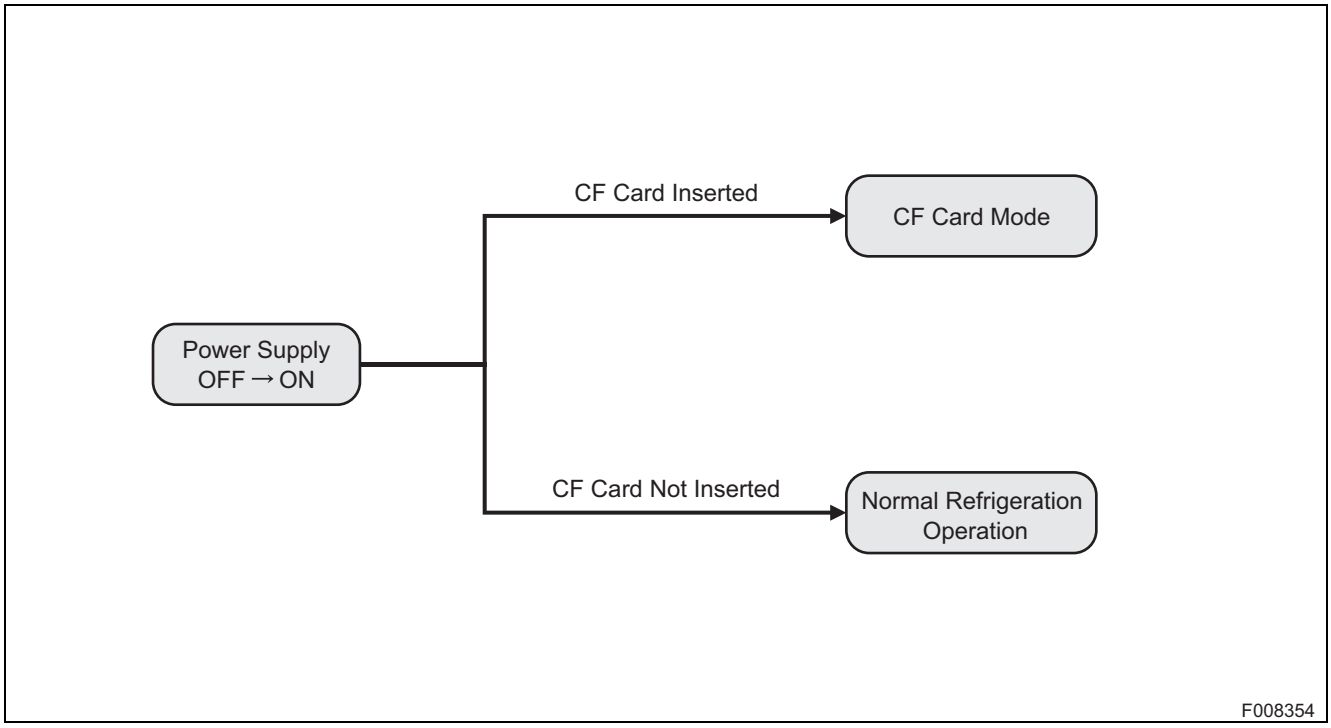


1) Press and hold ALARM for approximately three seconds.
2) The alarm code will appear as the measured value, and the alarm occurrence date will be shown on the sub-display.
3) When there are two or more past alarm code cases, use the ▲ or ▼ switch to display the next past alarm code.
   A maximum of ten past alarm code cases can be displayed.

7. CF Card Mode and Operation Method

7.1 CF Card Mode

- When the CF card is inserted and power is introduced, the system transitions to CF card mode.
  The CF card can be used for transport refrigerator software updates, settings data writing, etc.

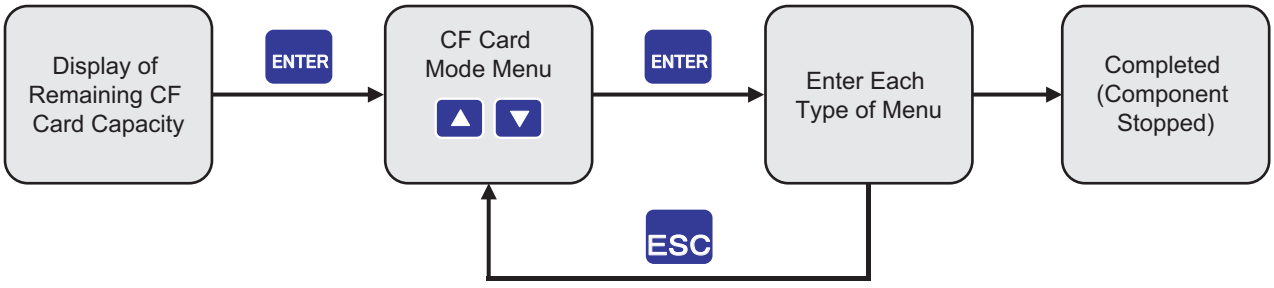


7.2 Initial Display Screen for CR Card Mode

- The initial display screen shows the remaining CF card capacity.

F010214

7.3 Operation Menu Transitions



F008356

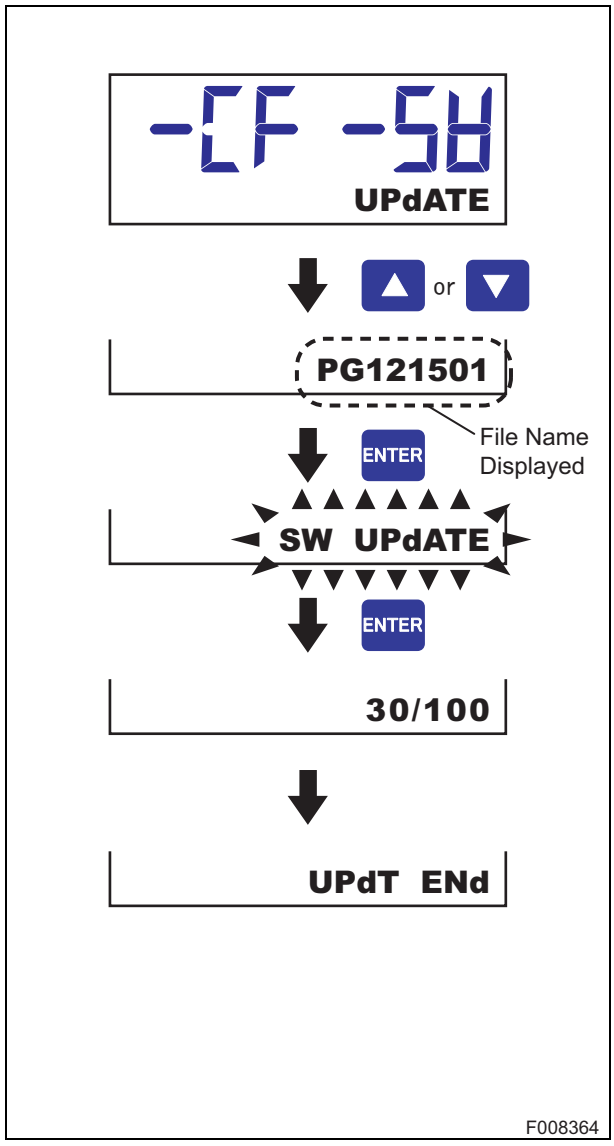
7.4 List of Items for the CF Card Mode Menu

Menu Content	Set Value	Measured Value	Sub-Display	Reference Page
Software update	-CF-	SW	UPdATE	P1-100
Settings data writing	-CF-	Id	SETTING	P1-101
Log data reading	-CF-	LOG	dOWNLOAd	P1-102

7.5 CF Card Mode Menu Operation

(1) Software Update

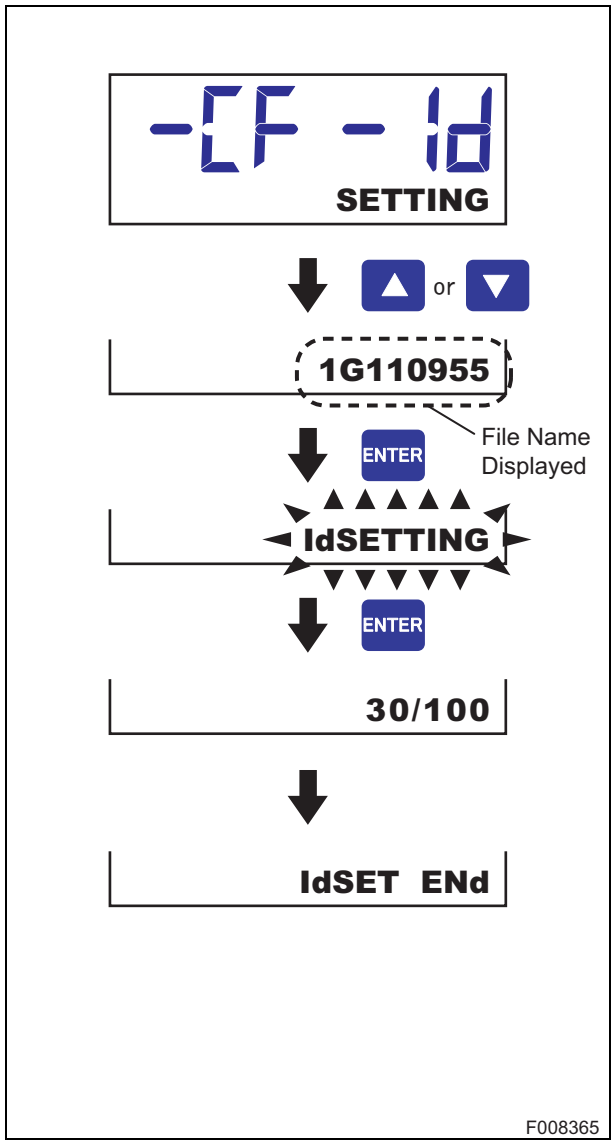
- Update the main ECU software.



1) Press ENTER to display "SW" as the measured value.
2) Use the ▲ or ▼ switch to select the file to be updated.
3) Press ENTER to prepare the update.
   "SW UPdATE" will flash.
4) Press ENTER to prepare the update.
   During the update, the remaining amount of the update task will be displayed.
5) When the update is completed successfully, "UPdT ENd" will display. If an abnormality has occurred, "UPdT FAIL" will display.

(2) Settings Data Writing

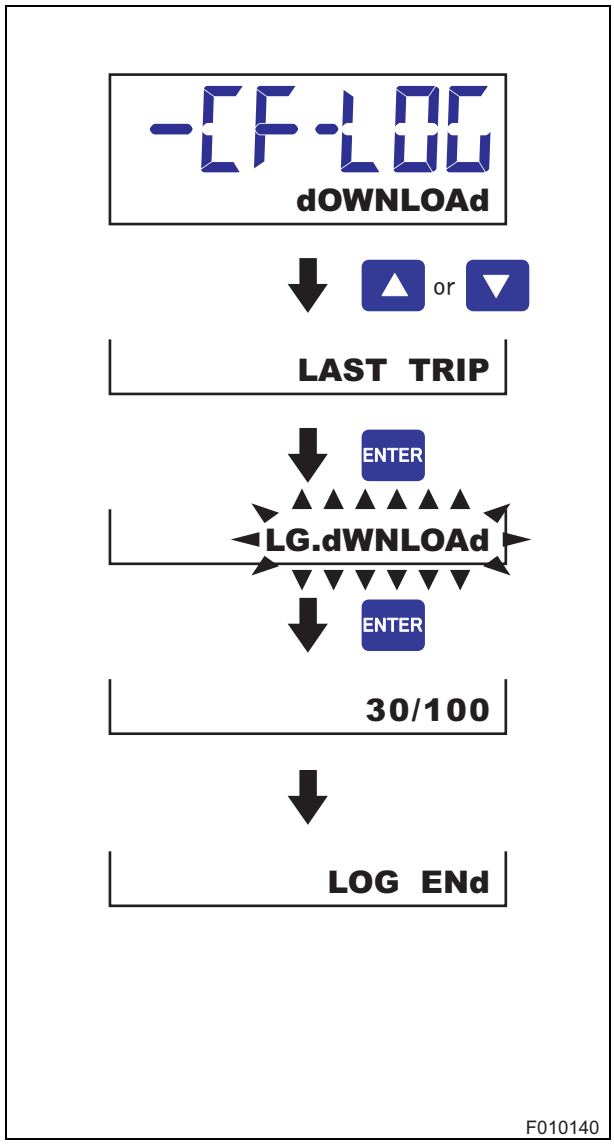
• Write settings data from the CF card to the main ECU.



1) Press ENTER to display "SW" as the measured value.
2) Use the ▲ or ▼ switch to display "ID" as the measured value, then press ENTER to confirm the setting.
3) Use the ▲ or ▼ switch to select the file to be written.
4) Press ENTER to prepare for writing.
   "idSETTING" will flash.
5) Press ENTER to start writing.
   During the writing process, the remaining amount of the writing task will be displayed.
6) When writing is completed successfully, "IdSET ENd" will display. If an abnormality has occurred, "IdSET FAIL" will display.

(3) Log Data Reading

• Read the main ECU log data to the CF card.



1) Press ENTER to display "SW" as the measured value.
2) Use the ▲ or ▼ switch to display "LOG" as the measured value, then press ENTER to confirm the setting.
3) Use the ▲ or ▼ switch to select the log data to be read.
   Selection range: LAST TRIP, 30DAYS, 60DAYS, 90DAYS, ALL TRIP
4) Press ENTER to prepare for reading.
   "LG.dWNLOAd" will flash. If the CF card does not have a sufficient amount of remaining capacity, "dISAbLE" will display.
5) Press ENTER to start reading.
   During the reading process, the remaining amount of the reading task will be displayed.
6) When reading is completed successfully, "LOG ENd" will display. If an abnormality has occurred, "LOG FAIL" will display.

1. Alarm Codes and Troubleshooting

1.1 Response Method by Alarm Code, and Related Parts

- When an alarm LED is lit, unit operation continues. Therefore, load cargo, and if there is no replacement part, continue operation as is.
- A flashing alarm LED indicates that another sensor is unsatisfactory. Since there is no substitute means of operation and the unit is stopped, perform troubleshooting, and replace parts as necessary.
- When an alarm occurs, verify the cause of the malfunction and take the appropriate actions in accordance with the following charts.

Alarm Code List	Description	Possible Cause	Verification Method	Related Parts	Installation Location (Refer to the Diagram)	Part Code
A01	The thermistor resistance value is outside the measurement range.	1. Sensor abnormality 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Measure the corresponding sensor resistance values (CN1, 2) and convert them into temperatures using the thermistor characteristics chart. Measure the temperature in the vicinity of the corresponding sensor, and check that it is the same as the converted value. 2. Check the wiring harness from the corresponding sensor up to the ECU and connector CN1 for poor contact, etc.	High Stage Compressor Discharge Temperature Sensor	Diagram3-1	6
A03				High Stage Compressor Body Temperature Sensor	Diagram3-2	
A05				Low Stage Compressor Suction Temperature Sensor	Diagram3-3	
A06				Low Stage Compressor Body Temperature Sensor	Diagram3-4	
A07				Ambient Temperature Sensor 1	Diagram1-9	
A08				Return Air Temperature Sensor 1	Diagram2-6	
A09				Supply Air Temperature Sensor 1	Diagram2-4	7
A10				Evaporator Inlet Temperature Sensor	Diagram2-7	6
A11				Evaporator Outlet Temperature Sensor	Diagram2-8	
A12				Economizer Inlet Temperature Sensor	Diagram3-5	
A13				Economizer Outlet Temperature Sensor	Diagram3-6	
A14				Defrost Temperature Sensor	Diagram2-10	8
A15	The pressure sensor output voltage is outside the measurement range.	1. Sensor abnormality 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Measure the output values (pins 2-3, 8-9, and 11-12 on CN3) for the corresponding sensors and convert them into pressures using the pressure characteristics table. Measure the pressure in the vicinity of the corresponding sensor, and check that it is the same as the converted value. 2. Check the wiring harness from the corresponding sensor up to the ECU and connector CN3 for poor contact, etc.	High Pressure Sensor	Diagram3-7	10
A16				Middle Pressure Sensor	Diagram3-14	
A17				Low Pressure Sensor	Diagram3-8	
A18	The current sensor output value is at or below the standard value.	1. Power supply phase interruption 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc. 3. Faulty magnetic contactor operation	1.Check that there is no phase interruption in each phase of the power supply. 2. Check that the breaker and terminal board screws are tight, and verify that CN7, CN10, and CN35 are not poorly or loosely connected. In addition, check the wiring harness from the sensor up to the ECU and the connector for any abnormalities. 3. Check for magnetic contactor breakage.	Current Sensor U	-	-
A19				Current Sensor V	-	-
A20				Current Sensor W	-	-
A21	The optional sensor thermistor resistance value is outside the measurement range.	1. Sensor abnormality 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Measure the corresponding sensor resistance values (CN1, CN2, CN40) and convert them into temperatures using the thermistor characteristics chart. Measure the temperature in the vicinity of the corresponding sensor, and check that it is the same as the converted value. 2. Check the wiring harness from the corresponding sensor up to the ECU and connector CN1 for poor contact, etc.	USDA Sensor 1	Diagram2-1	-
A22				USDA Sensor 2	Diagram2-2	-
A23				USDA Sensor 3	Diagram2-3	-
A24				Cargo Temperature Sensor	-	-
A25				Ambient Temperature Sensor 2	Diagram1-9	6
A26				Return Air Temperature Sensor 2	Diagram2-6	6
A27				Supply Air Temperature Sensor 2	Diagram2-5	7
A28	The humidity sensor output value is outside the measurement range.	1. Sensor abnormality 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Measure the output value (pins 5-6 on CN3) for the sensor and convert it into a humidity using the humidity sensor characteristics table. Measure the humidity in the vicinity of the humidity sensor, and check that it is the same as the converted value. 2. Check the wiring harness from the humidity sensor up to the ECU and connector CN3 for poor contact, abnormalities, etc.	Humidity Sensor	Diagram1-14	6
A29	Large difference in the measured values between sensor 1 and the optional sensor.	1.2. Sensor abnormality 3. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Measure the resistance value for both sensors and check that the values are the same. 2. Check that the installation location for each sensor is correct. 3. Check the wiring harness from each sensor up to the ECU and connector CN3 for poor contact, abnormalities, etc.	Ambient Temperature Sensors 1, 2	Diagram1-9	6
A30				Return Air Temperature Sensors 1, 2	Diagram2-6	6
A31				Supply Air Temperature Sensors 1, 2	Diagram2-4 Diagram2-5	7

Alarm Code List	Description	Possible Cause	Verification Method	Related Parts	Installation Location (Refer to the Diagram)	Part Code
A32	The sensor accuracy is outside the specification range.	1. Wiring harness open circuit, incorrect wiring, poor connector contact, etc. 2. Evaporator inlet temperature sensor abnormality 3. Low pressure sensor abnormality	1. Check the wiring harnesses from the evaporator inlet temperature sensor and the low pressure sensor up to the ECU and connectors CN1 and CN3 for poor contact, abnormalities, etc. 2. Measure the resistance value for the evaporator inlet temperature sensor and convert it into a temperature using the thermistor characteristics chart. Measure the temperature in the vicinity of the corresponding sensor, and check that it is the same as the converted value. In addition, check that the evaporator inlet temperature sensor location is correct. 3. Measure the output value (pins 11-12 on CN3) for the low pressure sensor and convert it into a pressure using the pressure sensor characteristics table. Measure the pressure in the vicinity of the low pressure sensor, and check that it is the same as the converted value.	Economizer Inlet Temperature Sensor Low Pressure Sensor	Diagram3-5 Diagram3-8	6 10
A33	The vent position sensor output value is outside the measurement range.	1. Sensor abnormality 2. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Check that the vent position sensor wires are connected. 2. Check the wiring harness from the vent position sensor up to the ECU and connector CN5 poor contact, abnormalities, etc.	Vent Position Sensor	Diagram1-13	6
B01	The refrigerant temperature at the high stage compressor outlet exceeds the standard value.	1. Evaporator expansion valve abnormality 2. Insufficient refrigerant	1. Check for poor contact in connectors near the evaporator expansion valve as well as the ECU connector (CN12). Check the wiring harness from the expansion valve up to the ECU for any abnormalities. Conduct a short PTI and check that the valve opens and closes. 2. Add the specified quantity of refrigerant.	High Stage Compressor	Diagram3-9	1
B02	The high stage compressor body temperature exceeds the standard value.	1. Evaporator expansion valve abnormality 2. Insufficient refrigerant	1. Check for poor contact in connectors near the evaporator expansion valve as well as the ECU connector (CN12). Check the wiring harness from the expansion valve up to the ECU for any abnormalities. Conduct a short PTI and check that the valve opens and closes. 2. Add the specified quantity of refrigerant.			
B03	The refrigerant temperature at the low stage compressor outlet exceeds the standard value.	Insufficient refrigerant	Add the specified quantity of refrigerant.	Low Stage Compressor	Diagram3-10	
B04	The low stage compressor body temperature	Insufficient refrigerant	Add the specified quantity of refrigerant.			
B05	exceeds the standard value. Pressure switch operation	1. High pressure increase abnormality 2. Fuse 2 blown 3. Magnetic contactor abnormality 4. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Check for factors causing the abnormal high pressure increase. 2. Visually check to see if fuse F2 is blown. 3. Check for 24 VAC on the coil side of MC1 (compressor contactor). 4. Check the wiring harness from the pressure switch up to the ECU and the connectors for any abnormalities.	High Pressure Switch	Diagram3-11	30
B06	The high stage compressor outlet pressure exceeds the standard value.	1. Check that the condenser fan is rotating, and rotating in the correct direction. 2. Condenser fins clogged with dirt or condenser corrosion/damage 3. Condenser fan damage 4. Condenser fan motor damage 5. MC5 (condenser fan contactor) damage 6. Clogged dryer 7. The temperature in the vicinity of the transport refrigerator has exceeded the specification range.	1.Check visually. 2.Check visually. 3.Check visually. 4. Turn contactor MC5 ON and measure the current value. 5. Check for magnetic contactor breakage. 6. Check for a temperature difference in the piping before and after the dryer. 7. Check to see if the condenser inlet temperature has exceeded 50°C.	Condenser Fan Condenser Fan Motor Condenser Fan Contactor Dryer	Diagram1-1 Diagram1-2 Diagram4-8 Diagram3-12	13 11 23 2
B07	The low stage compressor suction pressure has dropped below the standard value.	1. Evaporator expansion valve abnormality 2. Insufficient refrigerant	1. Check for poor contact in connectors near the evaporator expansion valve as well as the ECU connector (CN12). Check the wiring harness from the expansion valve up to the ECU for any abnormalities. Conduct a short PTI and check that the valve opens and closes. 2. Add the specified quantity of refrigerant.	Evaporator Expansion Valve Coil Evaporator Expansion Valve Body	Diagram1-4 Diagram1-3	4 3

Alarm Code List	Description	Possible Cause	Verification Method	Related Parts	Installation Location (Refer to the Diagram)	Part Code
B08	Cooling fan motor thermal operation	1. Abnormal temperature increase in the motor windings. 2. Fuse 3 blown 3. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Check for factors causing the abnormal temperature increase in the motor windings. 2. Visually check to see if fuse F3 is blown. 3. Check for 24 VAC on the coil side of MC6 or MC7. 4. Check the wiring harness from the motor up to the ECU and the connector for any abnormalities.	Cooling Fan Motor	Diagram1-7	12
B09	Voltage is not applied to the contactor coil during a condenser fan ON command.	1. Abnormal temperature increase in the motor windings 2. Fuse 2 blown 3. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Check for factors causing the abnormal temperature increase in the motor windings. 2. Visually check to see if fuse F2 is blown. 3. Check for 24 VAC on the coil side of MC5. 4. In addition, check the wiring harness from the motor up to the ECU and the connector for any abnormalities.	Condenser Fan Motor	Diagram1-2	11
B10	Voltage is not applied to the contactor coil during a heater ON command.	1. Abnormal temperature increase in the heater 2. Fuse 4 blown 3. Wiring harness open circuit, incorrect wiring, poor connector contact, etc.	1. Check for factors causing the abnormal temperature increase in the heater. 2. Visually check to see if fuse F4 is blown. 3. Check for 24 VAC on the coil side of MC2. 4. Check the wiring harness from the heater thermal switch up to the ECU and the connectors for any abnormalities.	Heater	Diagram2-9 Diagram4-1	9 23
B11	After coming into range, the value goes out of range for a fixed period of time.	Excessive frost on the evaporator	Check that there is no frost on the evaporator from the inspection port. If there is frost, conduct manual defrosting.	Evaporator	-	-
B12	The set temperature was not reached within a fixed period of time.	Excessive frost on the evaporator	1. Check that there is no frost on the evaporator from the inspection port. If there is frost, conduct manual defrosting. 2. Check that the cargo has been pre-cooled.	Evaporator	-	-
B13	Insufficient refrigeration capacity	Excessive frost on the evaporator	1. Check that there is no frost on the evaporator from the inspection port. If there is frost, conduct manual defrosting. 2. Check that the cargo has been pre-cooled.	Evaporator	-	-
B14	The exhaust outlet is open during frozen operation.	1. The exhaust outlet is open 2. Faulty sensor	1. Check to see if the exhaust outlet is open. 2. Check that the vent position sensor wires are connected.	Vent Position Sensor	Diagram1-13	6
C01	An abnormality has occurred in the inverter.	1. Operating outside the specification range. 2. Open circuit, etc. in the communication wiring harness between the inverter and ECU. 3. Poor connector contact. 4. When MC1 is OFF 5. The power supply voltage has fallen below the usage range. 6. DC reactor damage 7. Open circuit in the output lines, motor abnormality	1. Turn the power supply OFF and then back ON, and then verify that the transport refrigerator operates without any problems. 2. If the compressor is found to be not operating as a result of the check above, check continuity in the connector for the inverter communication wiring harness. 3. Visually check for signs of fretting wear on the terminals, and the presence of wear particles. Check both the ECU-side and sensor-side connectors. Visually check to see if the female terminal is spread open. Visually check to see if the male terminal is bent. 4. Check continuity in the wiring harness between the ECU and contactor. Visually check for wear on the ECU connector terminals. 5. Check the inverter input voltage. 6. Check continuity between the DC reactor terminals. 7. Check resistance between the motor leads on the inverter-side output.	High Stage Inverter	Diagram5-2	27
C02				High Stage Compressor	Diagram3-9	1
C03				High Stage Inverter	Diagram5-2	27
C04						
C05						
C06						
C07						
C08						
C09						
C10						
C11						
C12						
C13						
C14						
C15						
C16				Low Stage Inverter	Diagram5-1	
C17				Low Stage Compressor	Diagram3-10	1
C18				Low Stage Inverter	Diagram5-1	27
C19						
C20						
C21						
C22						
C23						
C24						
C25						
C26						
C27						
C28						
C29						
C30						

F010218

Alarm Code List	Description	Possible Cause	Verification Method	Related Parts	Installation Location (Refer to the Diagram)	Part Code
D01	The main power supply voltage is below the usage range.	1. The power supply voltage is below the usage range for one second. 2. Wiring harness open circuit, incorrect wiring, connector poor contact, etc. 3. Transformer malfunction	1. Measure the power supply voltage; check that the value is at least 360 V. 2. Check for abnormalities in the wiring between the transformer and the CN25 connector. 3. Measure the voltage at pins 1 and 2 on CN25. Check that the voltage between pins 1 and 2 = power supply voltage x 15 V/440 V.	Transformer	Diagram4-2	18
D02	The main power supply voltage is above the usage range.	1. The power supply voltage is above the usage range for one second. 2. Wiring harness open circuit, incorrect wiring, connector poor contact, etc. 3. Transformer malfunction	1. Measure the power supply voltage; check that the value is 500 V or less. 2. Check for abnormalities in the wiring between the transformer and the CN25 connector. 3. Measure the voltage at pins 1 and 2 on CN25. Check that the voltage between pins 1 and 2 = power supply voltage x 15 V/440 V.	Transformer	Diagram4-2	18
D03	The main power supply frequency is outside the usage range.	1. The power supply frequency is outside the usage range. 2. Wiring harness open circuit, incorrect wiring, connector poor contact, etc. 3. Main ECU malfunction 4. A device is generating noise	1. Measure the power supply frequency; check that the value is 48 ~ 52 Hz or 58 ~ 62 Hz. 2. Check for abnormalities in the wiring between the transformer and CN25 connector. 3. Measure the voltage between pins 1 and 2 on CN25; check that the value is at least 12 VAC. 4. Check whether the device generating the noise is connected to the same power supply line (electric welder, etc.)	Main ECU	Diagram4-6	16
D04	The power supply phase sequence cannot be determined.	1. Blown fuse 2. Faulty current sensor, wiring harness 3. Power supply phase interruption	1. Is fuse F2/F3 blown? 2. Is each wiring harness connected to each current sensor? Check to make sure connector CN6 is fully connected. 3. Check for phase interruption in the power supply.	Current Sensor R, S, T Phase Sequence Connector	Diagram4-7 Diagram4-3	25 22
D05	The battery is disconnected.	1. Battery connector disconnected 2. Poor connector contact. 3. Faulty battery	1. Check to see if the battery is connected. 2. Check for looseness in the connector CN28 terminals. 3. Measure the voltage between pins 1 and 2 on connector CN28. If the value is 10 V or more, the battery is faulty.	Battery	Diagram4-4	21
D06	The operation panel key switch is stuck down.	1. Key switch malfunction 2. An obstruction has been in contact with the key switch for an extended period of	1. Check each key switch operation. 2. Check for any items in contact with the panel.	Control Panel	Diagram4-5	17
D07	Communications between the ECU and control panel have been interrupted.	Faulty wiring harness	Check for loose terminals in connector CN01 on the control panel side and connector CN24 on the main ECU side. Also check for wiring harness abnormalities.	Main ECU	Diagram4-6	16
				Control Panel	Diagram4-5	17
D11	The 12-volt power supply is below the usage range.	Layer short in the electronic expansion	Disconnect connector CN12 and verify that the alarm code disappears.	Electronic Expansion Valve Coil	-	-
D12	RTC abnormality	Main ECU malfunction	Replace the main ECU.	Main ECU	Diagram4-6	16
D13	EEPROM abnormality	Main ECU malfunction	Replace the main ECU.	Main ECU	Diagram4-6	16
D14	Flash memory abnormality	Main ECU malfunction	Replace the main ECU.	Main ECU	Diagram4-6	16
D15	ADC abnormality	Main ECU malfunction	Replace the main ECU.	Main ECU	Diagram4-6	16
E01	Communications between the ECU and control panel have been interrupted.	1. Faulty wiring harness 2. Control panel ECU malfunction	Check for loose terminals in the control panel side connector and connector CN24 on the main ECU side. Also check for wiring harness abnormalities.	Control Panel ECU	-	-

2. Replacement Parts

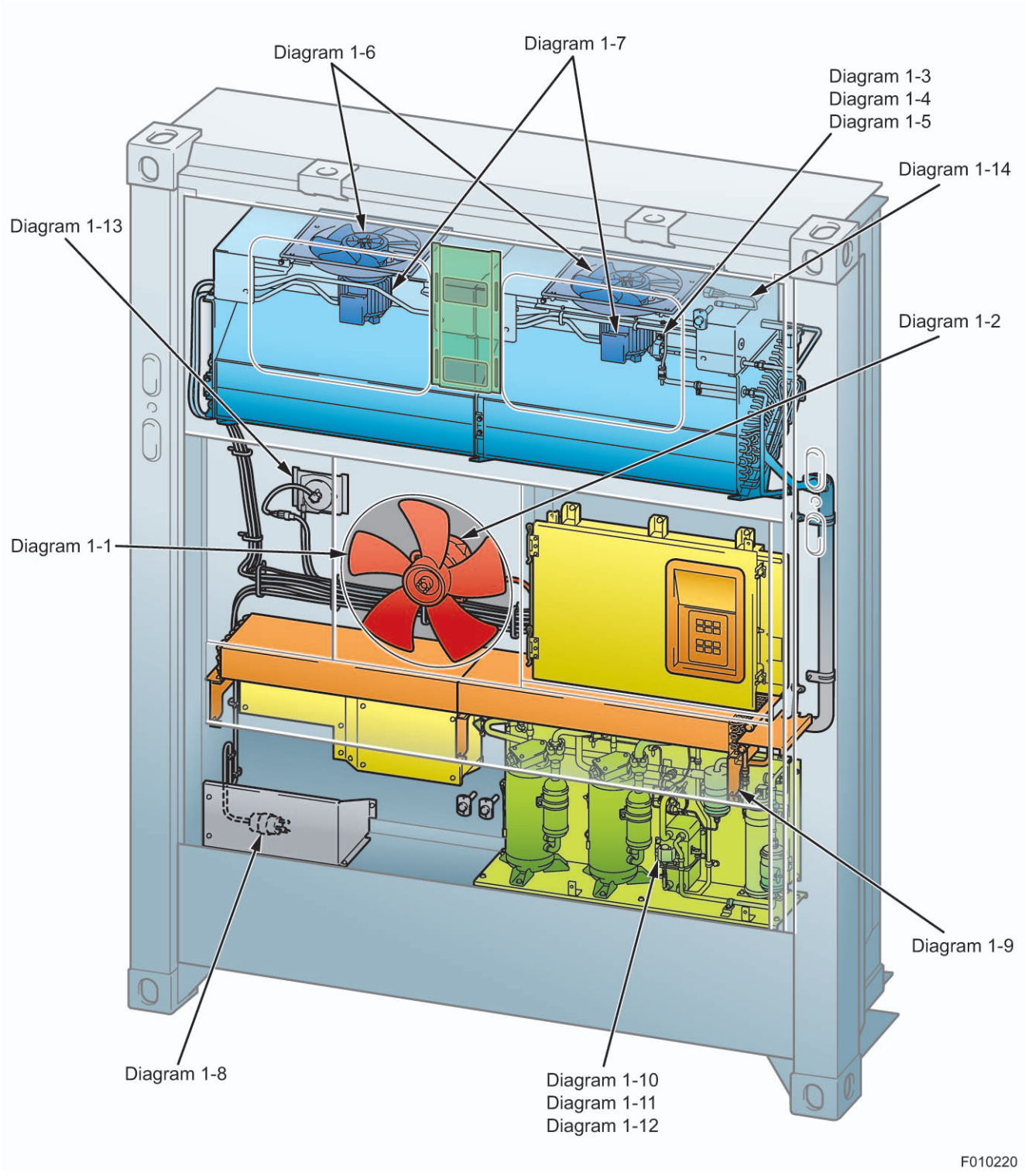
2.1 Replacement Parts List

Part Number	Part Name		Installation Location (Refer to the Diagram)
1	Compressor	High Stage Compressor	Diagram 3-9
		Low Stage Compressor	Diagram 3-10
2	Dryer		Diagram 3-12
3	Expansion Valve Body	For Evaporator	Diagram 1-3
		For Economizer	Diagram 1-10
4	Expansion Valve Coil	For Evaporator	Diagram 1-4
		For Economizer	Diagram 1-11
5	Expansion Valve Coil Cover	For Evaporator	Diagram 1-5
		For Economizer	Diagram 1-12
6	Thermistors	Ambient Temperature Sensor	Diagram 1-9
		Vent Position Sensor	Diagram 1-13
		Humidity Sensor	Diagram 1-14
		Return Air Temperature Sensor	Diagram 2-6
		Evaporator Inlet Temperature Sensor	Diagram 2-7
		Evaporator Outlet Temperature Sensor	Diagram 2-8
		Economizer Inlet Temperature Sensor	Diagram 3-5
		Economizer Outlet Temperature Sensor	Diagram 3-6
		High Stage Compressor Discharge Temperature Sensor	Diagram 3-1
		High Stage Compressor Body Temperature Sensor	Diagram 3-2
		Low Stage Compressor Suction Temperature Sensor	Diagram 3-3
		Low Stage Compressor Body Temperature Sensor	Diagram 3-4
7	Thermistors	Supply Air Temperature Sensor 1	Diagram 2-4
		Supply Air Temperature Sensor 2	Diagram 2-5
8	Thermistor	Defrost Temperature Sensor	Diagram 2-10
9	Heater Thermal Switch		Diagram 2-9

Part Number	Part Name		Installation Location (Refer to the Diagram)
10	Pressure Sensors	High Pressure Sensor	Diagram 3-7
		Middle Pressure Sensor	Diagram 3-14
		Low Pressure Sensor	Diagram 3-8
11	Condenser Fan Motor		Diagram 1-2
12	Cooling Fan Motor		Diagram 1-7
13	Condenser Fan		Diagram 1-1
14	Cooling Fan		Diagram 1-6
15	Sight Glass		Diagram 3-13
16	Main ECU		Diagram 4-6
17	Control Panel		Diagram 4-5
18	Transformer		Diagram 4-2
19	Power Supply Switch		Diagram 4-11
20	Power Supply Switch Cap		Diagram 4-12
21	Battery		Diagram 4-4
22	Contactor	Compressor Contactor (MC1)	Diagram 4-15
		Phase Sequence Contactors (MC3, MC4)	Diagram 4-3
23	Contactors	Heater Contactor (MC2)	Diagram 4-1
		Condenser Fan Contactor (MC5)	Diagram 4-8
		Cooling Fan HI Contactor (MC6)	Diagram 4-9
		Cooling Fan LO Contactor (MC7)	Diagram 4-10
24	Circuit Breaker		Diagram 4-13
25	Current Sensors R, S, T		Diagram 4-7
26	Fuses		Diagram 4-14
27	Inverters	Low Stage Inverter	Diagram 5-1
		High Stage Inverter	Diagram 5-2
28	Noise Filter		Diagram 5-5
29	Reactors	Low Stage DC Reactor	Diagram 5-3
		High Stage DC Reactor	Diagram 5-4
30	High Pressure Switch		Diagram 3-11
31	Power Cord		Diagram 1-8

3. Part Installation Locations

3.1 Diagram 1



3.2 Diagram 2

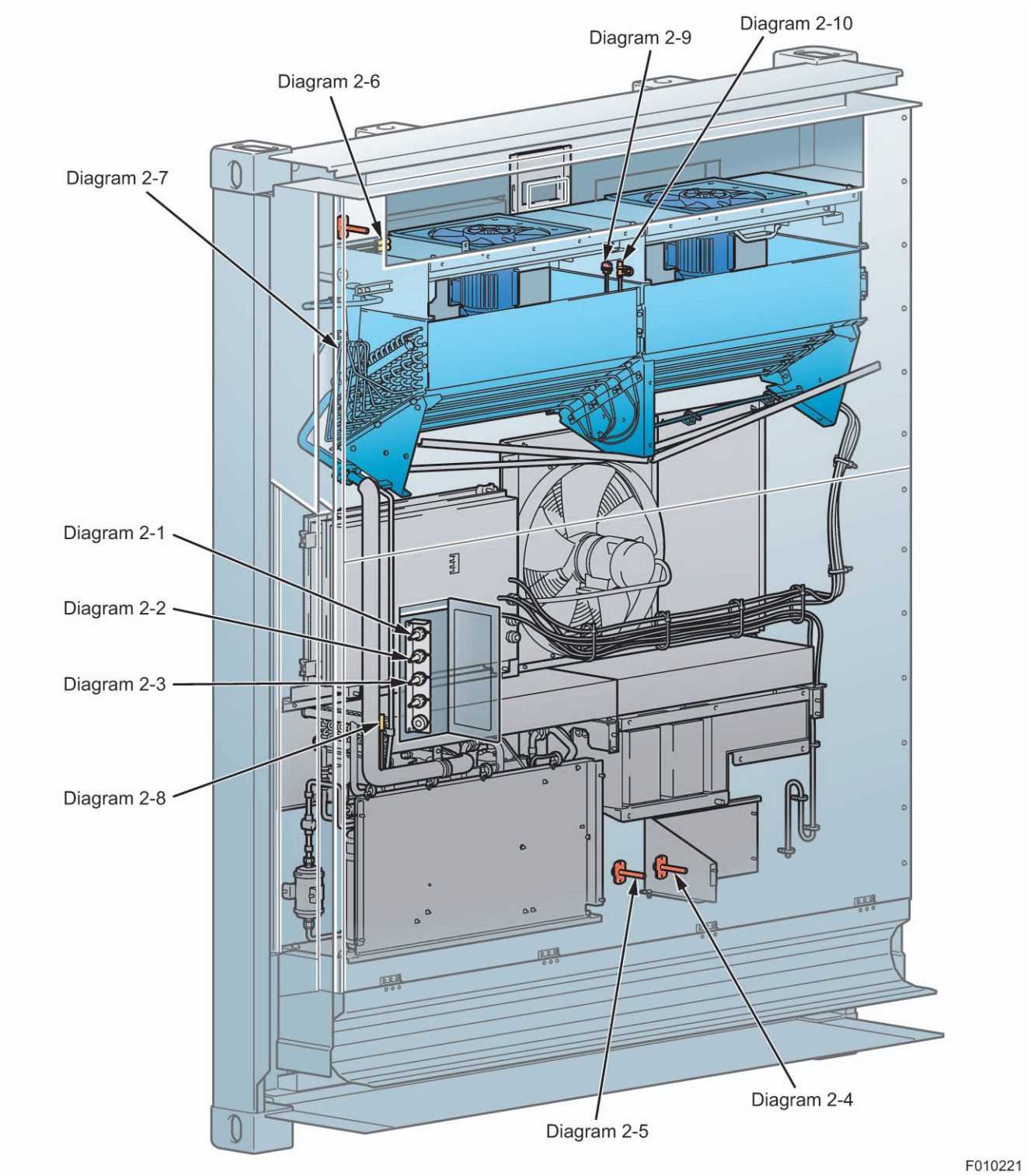


Diagram 2-10
Diagram 2-9
Diagram 2-6
Diagram 2-7
Diagram 2-1
Diagram 2-2
Diagram 2-3
Diagram 2-8
Diagram 2-4
Diagram 2-5
F010221

3.3 Diagram 3

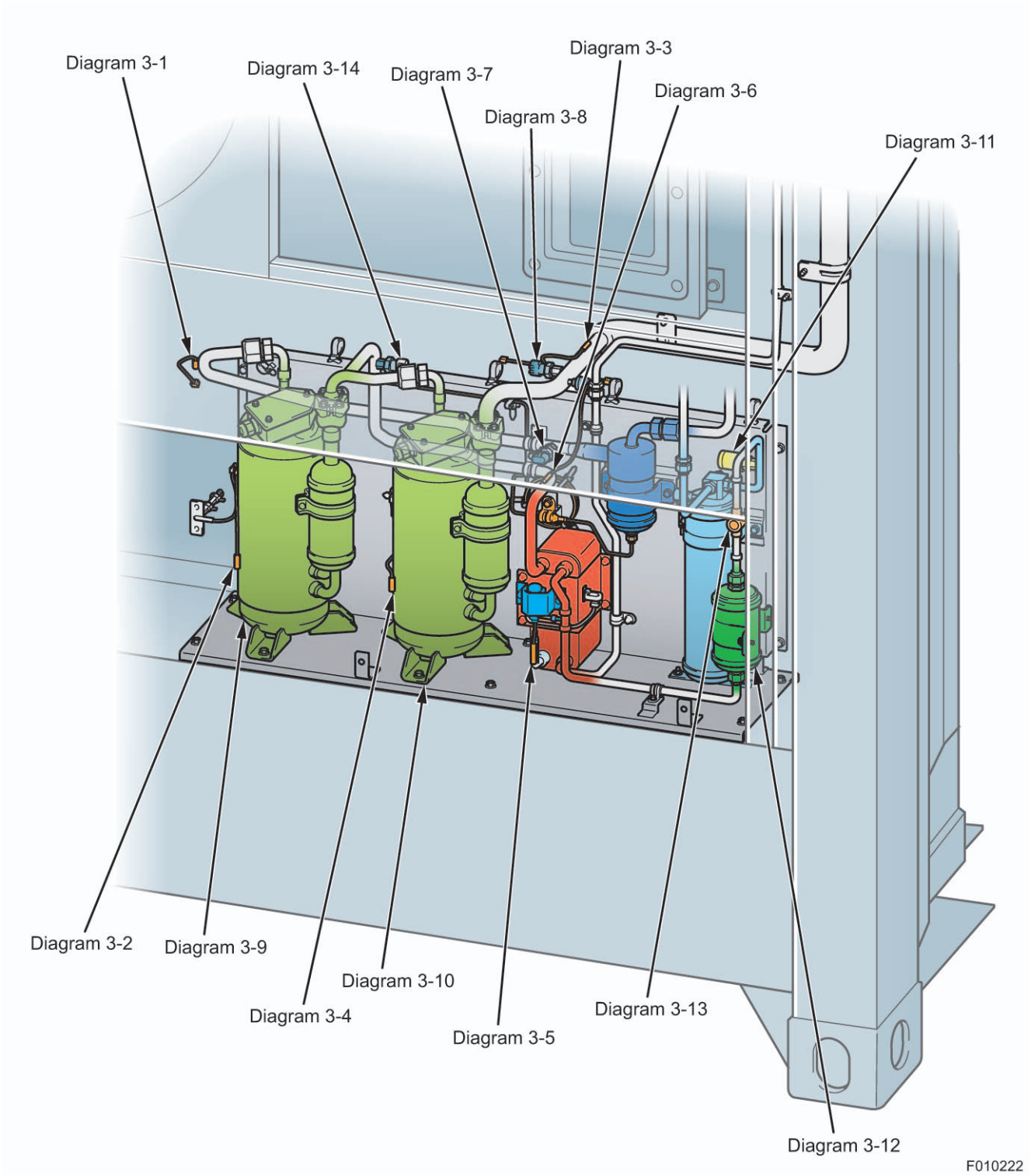
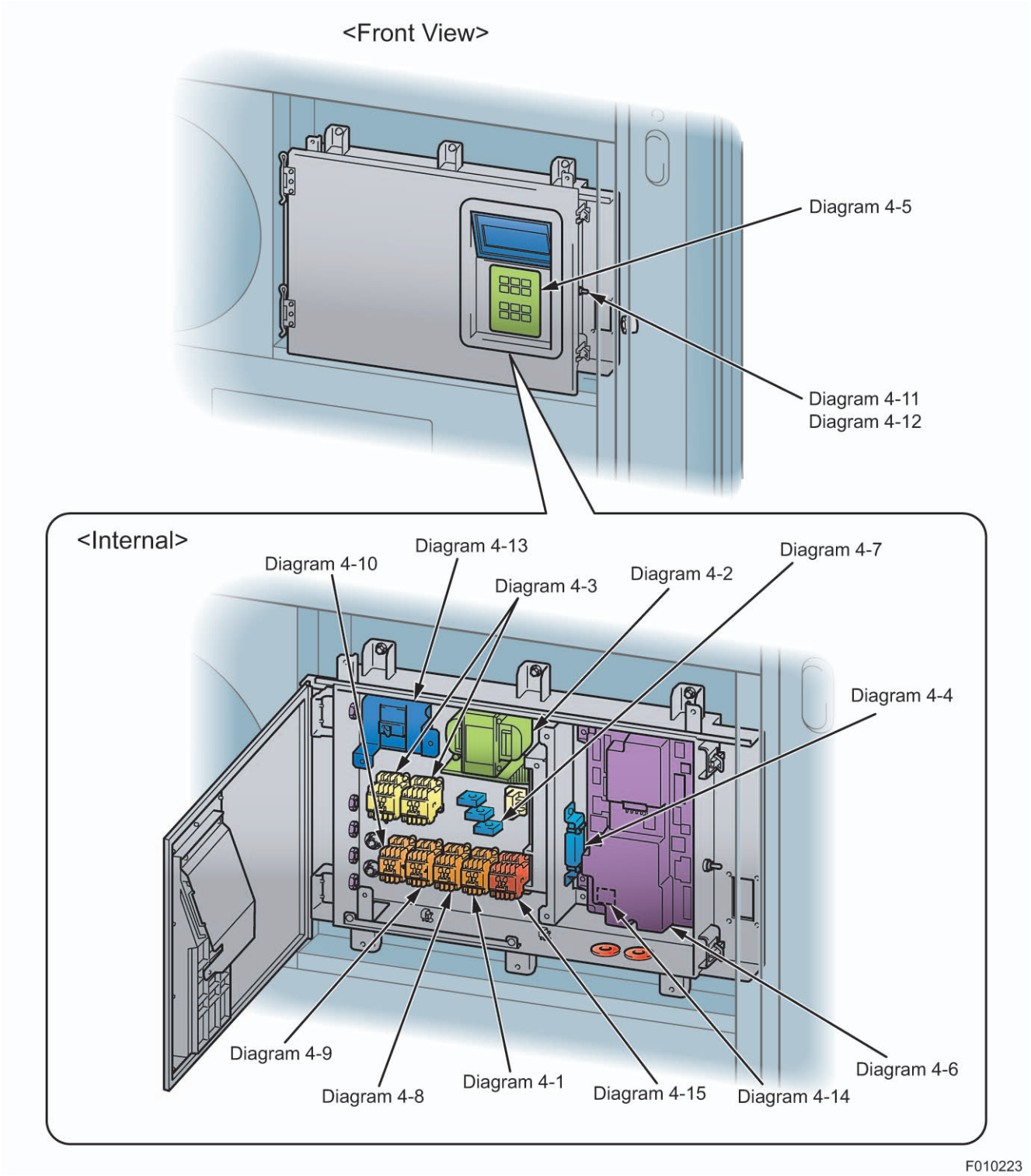


Diagram 3-1
Diagram 3-14
Diagram 3-7
Diagram 3-3
Diagram 3-6
Diagram 3-8
Diagram 3-11
Diagram 3-2
Diagram 3-9
Diagram 3-10
Diagram 3-4
Diagram 3-5
Diagram 3-13
Diagram 3-12
F010222

3.4 Diagram 4


<Front View>
Diagram 4-5
Diagram 4-11
Diagram 4-12
<Internal>
Diagram 4-10
Diagram 4-13
Diagram 4-3
Diagram 4-2
Diagram 4-7
Diagram 4-4
Diagram 4-9
Diagram 4-8
Diagram 4-1
Diagram 4-15
Diagram 4-14
Diagram 4-6
F010223

3.5 Diagram 5

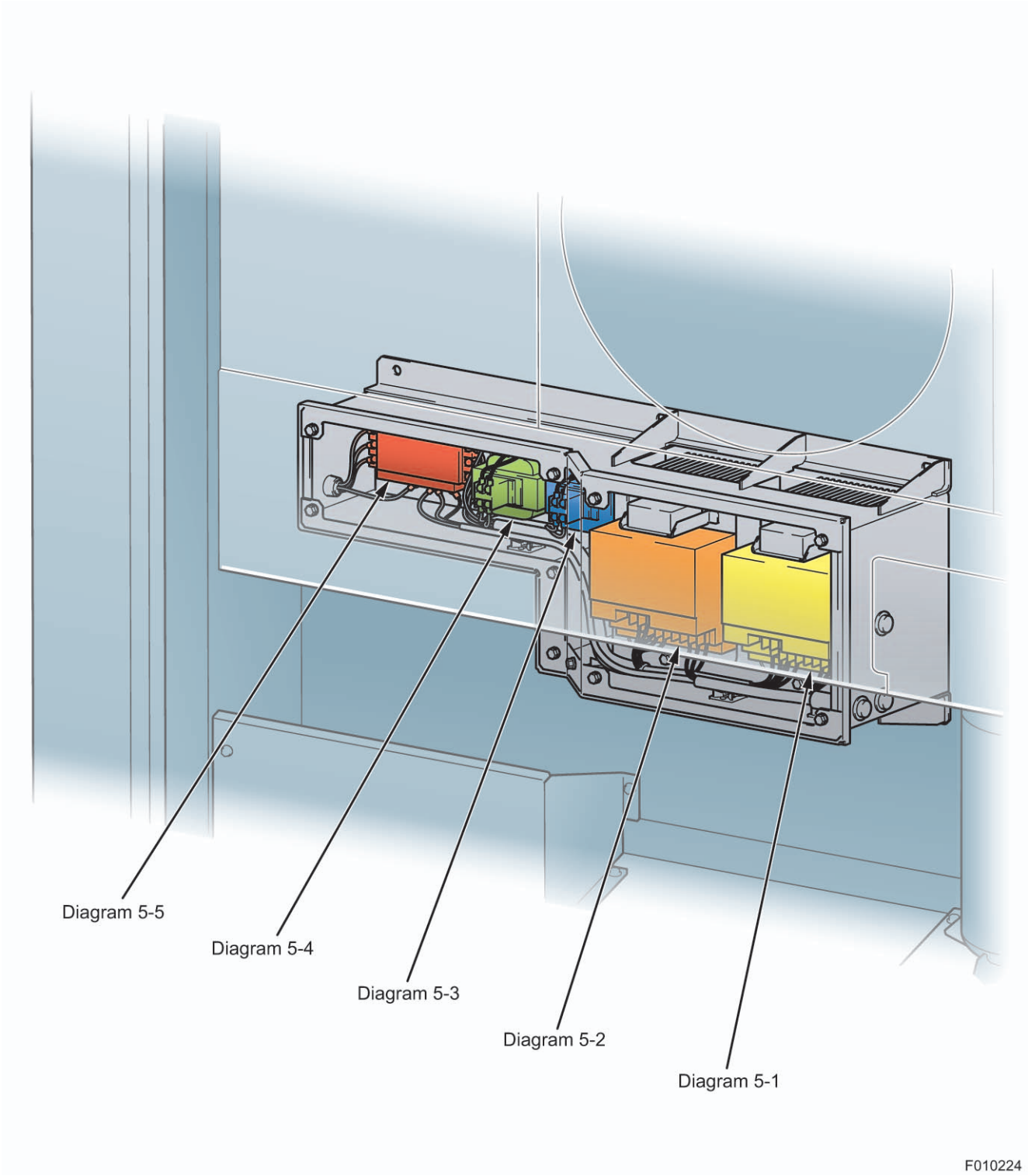


Diagram 5-5
Diagram 5-4
Diagram 5-3
Diagram 5-2
Diagram 5-1
F010224

4. Primary Component Characteristics

4.1 Characteristic Values

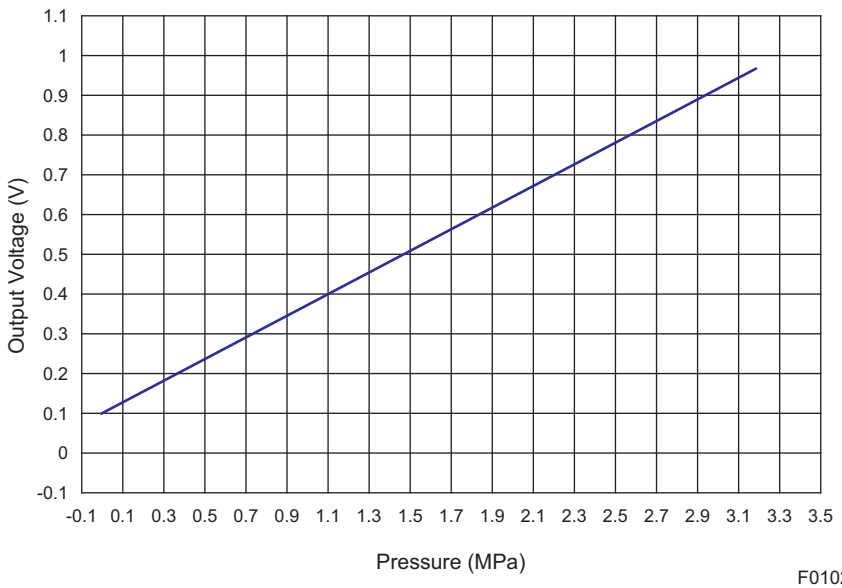
(1) Compressor

Resistance Value	0.73 Ω ±7%
Insulation Resistance (500 VDC Megger)	At least 10 MΩ
Installation Bolts (M8)	8.4 ~ 15.6 N·m

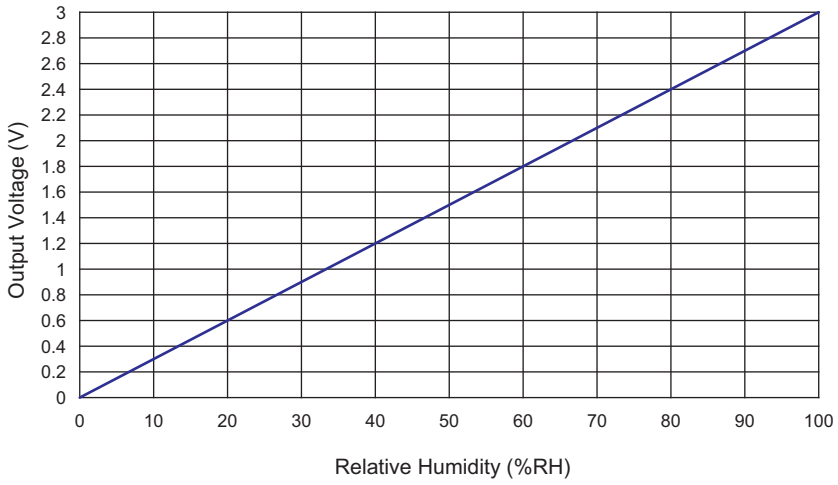
(2) Expansion Valve

Resistance Value	46 Ω ±3 Ω
Insulation Resistance (500 VDC Megger)	At least 10 MΩ

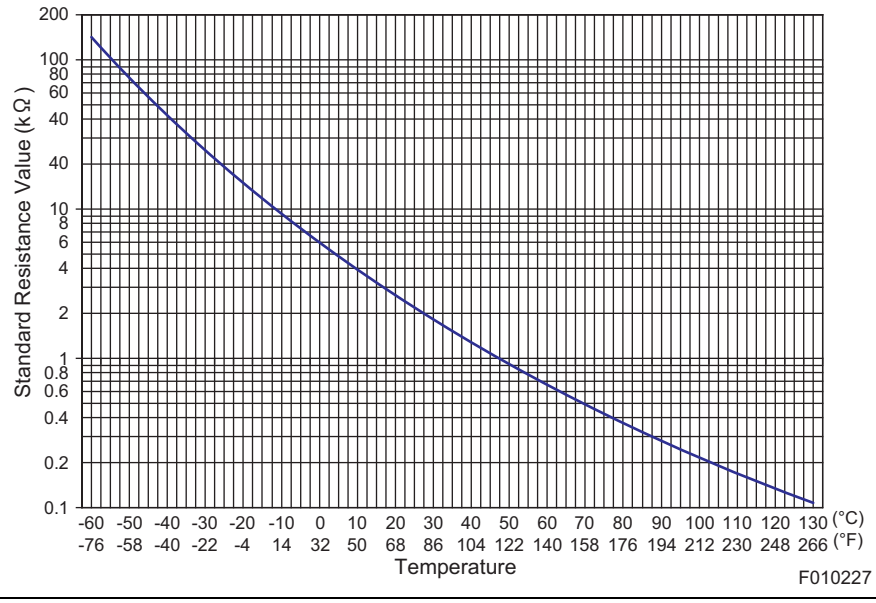
(3) Pressure Sensor

Output voltage value	

(4) Humidity Sensor (Optional)

Output Voltage Value	 F010226

(5) Temperature Sensor

Resistance Value	 F010227

(6) Condenser Fan Motor

Current Value	60 Hz operation	1.0 A
	50 Hz operation	0.6 A
Resistance Value		39.9 Ω ±10 %
Insulation Resistance (500 VDC Megger)		At least 10 MΩ
Installation Bolts (M8)		8.4 ~ 15.6 N·m
Clearance between Fan and Shroud		3.0 ~ 5.0 mm

(7) Cooling Fan Motor

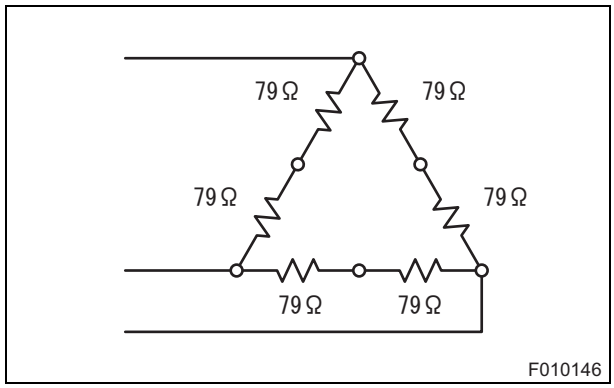
Current Value	60 Hz operation	High speed 3.0 A*
		Low speed 0.7 A*
	50 Hz operation	High speed 1.7 A*
		Low speed 0.4 A*
Resistance Value		High speed 30.1 Ω ±10 %
		Low speed 115 Ω ±10 %
Insulation Resistance (500 VDC Megger)		At least 10 MΩ
Installation Bolts (M8)		8.4 ~ 15.6 N·m
Clearance between Fan and Shroud		3.0 ~ 5.0 mm

* : Value for two motors.

(8) Heater

Current Value	4.8 A (when 440 VAC)*
Resistance Value	79 Ω ±5 %
Insulation Resistance (500 VDC Megger)	At least 0.3 MΩ

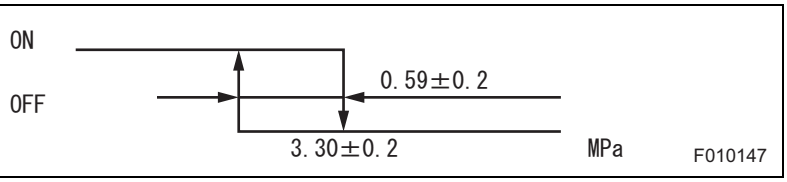
* : As per the following, the current value is for one phase when six heaters are connected in a Δ configuration.



(9) Contactors
(Cooling Fan LO Contactor, Cooling Fan HI Contactor, Condenser Fan Contactor, Heater Contactor, Compressor Contactor, Phase Sequence Contactor)

Resistance Value	3 Ω ±10 %
Insulation Resistance (500 VDC Megger)	At least 10 MΩ

(10) High Pressure Switch

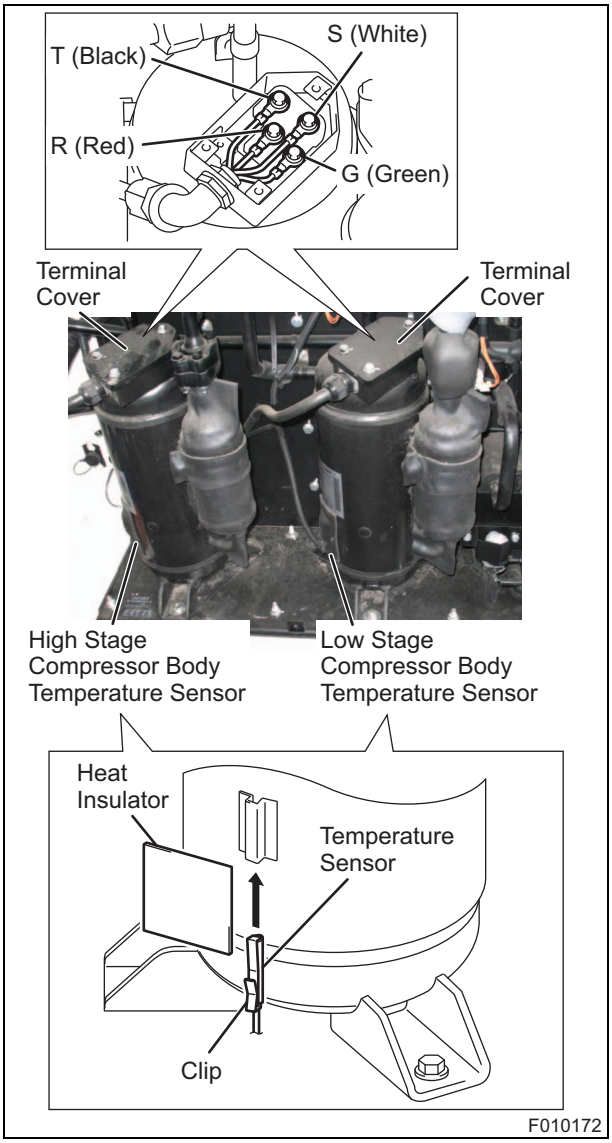
High-Pressure Operating Values	

5. Parts Disassembly and Assembly

5.1 Disassembly and Assembly Procedures

(1) Compressors

(Removal Procedure)



1) Remove the terminal cover.
2) Remove the power supply terminal screws.
3) Loosen the connector seal nut to disconnect the power cord.
4) Peel the heat insulator off of the compressors.
5) Remove the temperature sensor clips from the compressors.
6) Remove the sensors from the clips. Reuse the clips.
7) Remove the compressor installation bolts.
8) Disconnect the high and low-pressure pipe joints.

Part	Compressor
Refrigerant Recovery	Required
Special Tools	-
Other Required Parts	O-rings, heat insulators, waterproof washers

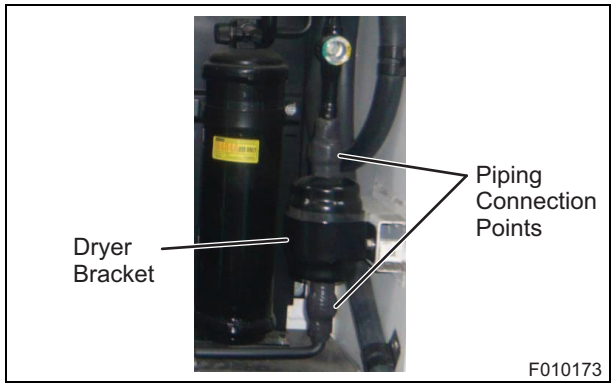
Part	Compressor
ATTENTION Items	• Do not reuse O-rings, heat insulators, or the waterproof washers for terminal cover installation. • Do not allow items such as loose threads or dust to adhere to pipe connections. Doing so may lead to loose pipe connections. Do not wear cotton gloves when connecting pipes. • Preliminarily tighten pipes by hand, then use an open-end wrench (spanner) to perform the final tightening. • **Do not confuse the wiring locations for the power supply terminals. If the wiring procedure is not followed, the compressor will rotate in the opposite direction.** **R (Red), S (White), T (Black), G (Green)** • Use insulated washers to install the compressor. • Since an oil separator is included, there is not need to add oil. • Quickly connect all pipes after the compressor piping caps are removed. Failing to do so may lead to moisture being adsorbed by the oil. • Do not scratch the outside of the compressor when performing work. Doing so may lead to corrosion and/or rusting due to the paint peeling.

(Installation Procedure)

1) Connect the compressor high and low-pressure piping connections.
   High-pressure piping tightening torque: 41.0 (39.2 ~ 44.1) N·m
   Low-pressure piping tightening torque: 25.0 (17.5 ~ 32.5) N·m
2) Tighten the compressor installation bolts.
   Tightening torque: 12.0 (8.4 ~ 15.6) N·m
3) Insert the temperature sensors into the clips.
4) Attach the clips and sensors to the brackets on the compressor body.
5) Attach heat insulators so that there is no gap between the compressors and sensors.
6) Connect the power cord to the power supply terminals.
   Tightening torque: 2.7 (2.4 ~ 2.9) N·m
7) Tighten the connector seal nut.
   Tightening torque: 1.9 (1.8 ~ 2.0) N·m
8) When attaching the terminal cover, replace the waterproof washers with new parts, then tighten the bolts.
   Tightening torque: 3.0 (2.7 ~ 3.3) N·m

(2) Dryer

(Removal Procedure)



1) Remove the dryer bracket.
2) Peel off the butyl rubber on the piping connections.
3) Loosen the nuts on the connection joints.
4) Remove the dryer bracket.

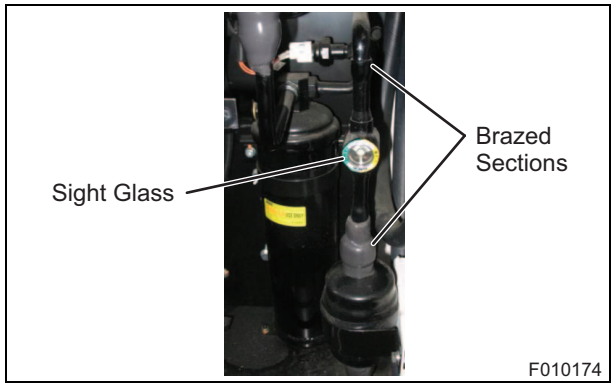
Part	Dryer
Refrigerant Recovery	Required
Special Tools	-
Other Required Parts	Insulating sheet, butyl rubber
ATTENTION Items	-

(Installation Procedure)

1) Install the dryer by using the removal procedure in reverse order.
   Tightening torque: 34.3 (29.4 ~ 39.2) N·m

(3) Sight Glass

(Removal Procedure)



1) Heat the brazed sections of the pipe with a burner and remove the sight glass.

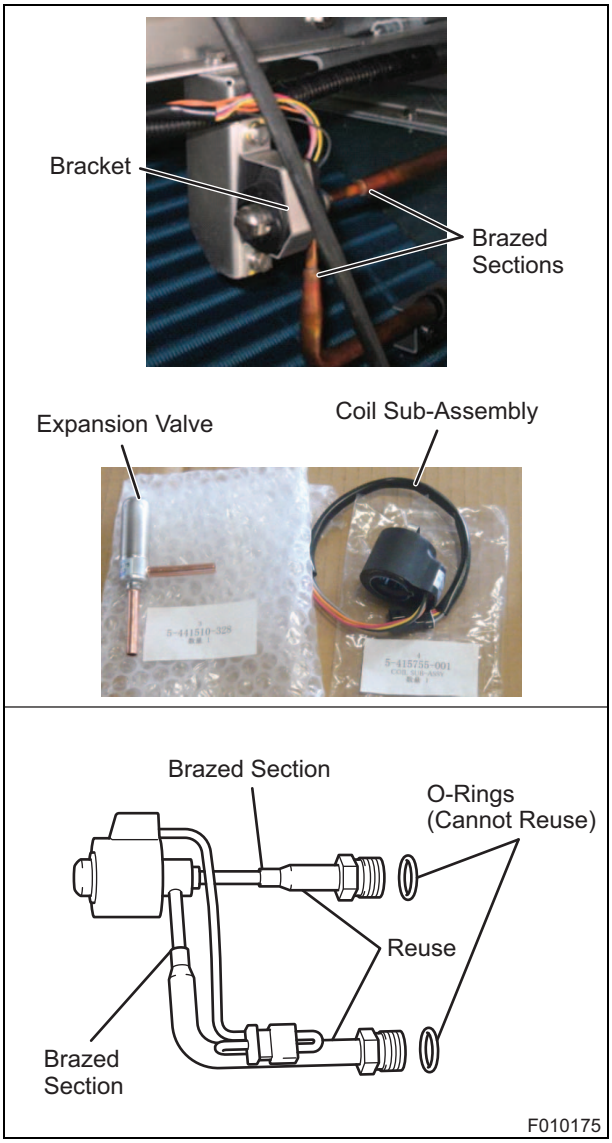
Part	Sight Glass
Refrigerant Recovery	Required
Special Tools	Brazing tool
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the sight glass by brazing the pipe.

(4) Expansion Valve (Evaporator Side)

(Removal Procedure)



1) Remove the bracket.
2) Remove the coil sub-assembly.
3) Loosen the piping nut and remove the expansion valve.
4) Heat the two brazed sections of the pipe with a burner and remove the expansion valve.
   Reuse the removed piping.

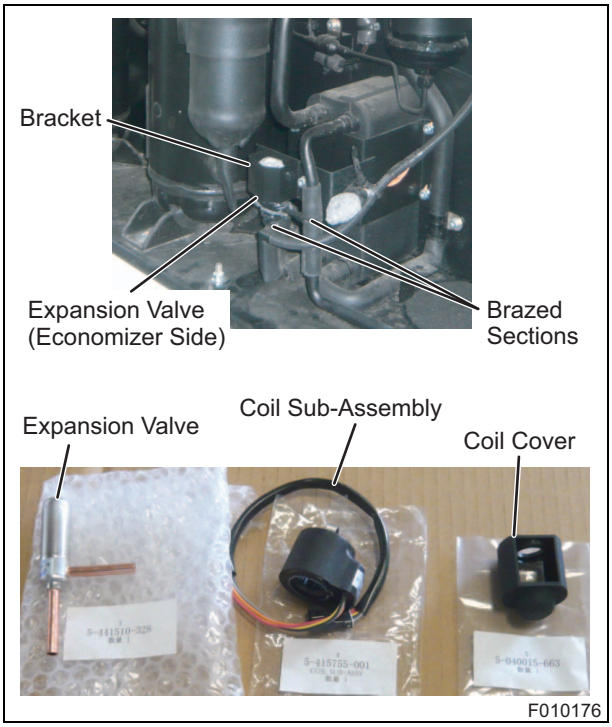
Part	Expansion Valve (Evaporator Side)
Refrigerant Recovery	Required
Special Tools	Brazing tool
Other Required Parts	O-rings
ATTENTION Items	When brazing, wrap the expansion valve body in a damp cloth or the like to provide cooling. The O-rings cannot be reused.

(Installation Procedure)

1) Attach the expansion valve by using the removal procedure in reverse order.
   Piping connection points
   Tightening torque: 22.1 (19.6 ~ 24.5) N·m
   Bracket
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m

(5) Expansion Valve (Economizer Side)

(Removal Procedure)



1) Remove the bracket.
2) Remove the coil cover.
3) Remove the coil sub-assembly.
4) Remove the expansion valve from the piping at the brazed sections.

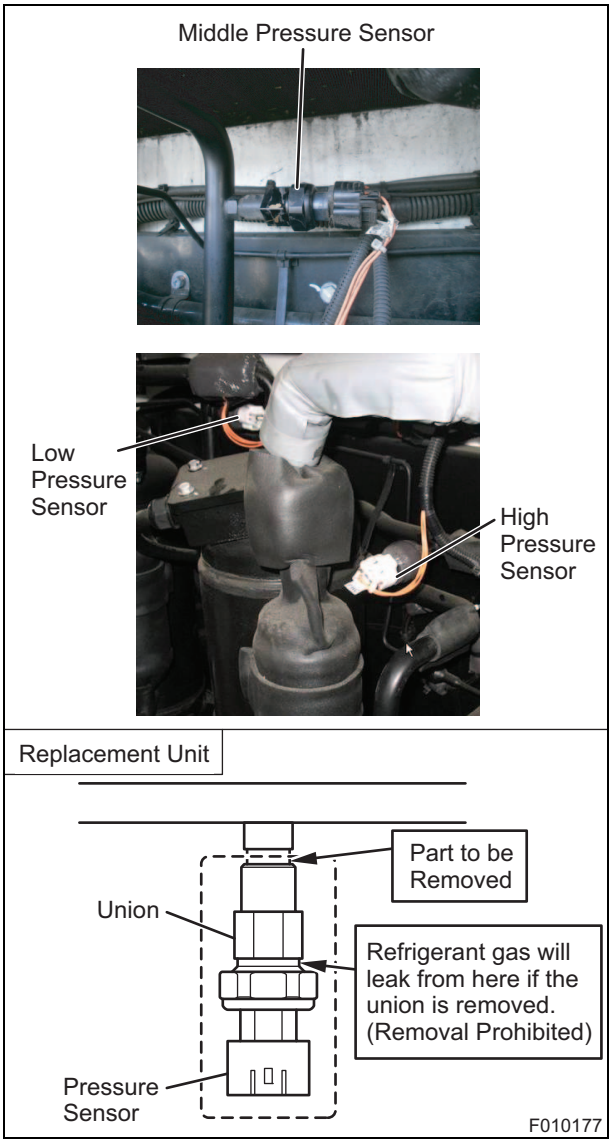
Part	Expansion Valve (Economizer Side)
Refrigerant Recovery	Required
Special Tools	Brazing tool
Other Required Parts	-
ATTENTION Items	When brazing, wrap the expansion valve body in a damp cloth or the like to provide cooling.

(Installation Procedure)

1) Attach the expansion valve by using the removal procedure in reverse order.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m

(6) Pressure Sensors

(Removal Procedure)



1) Disconnect the pressure sensor connectors.
2) Remove the pressure sensors.

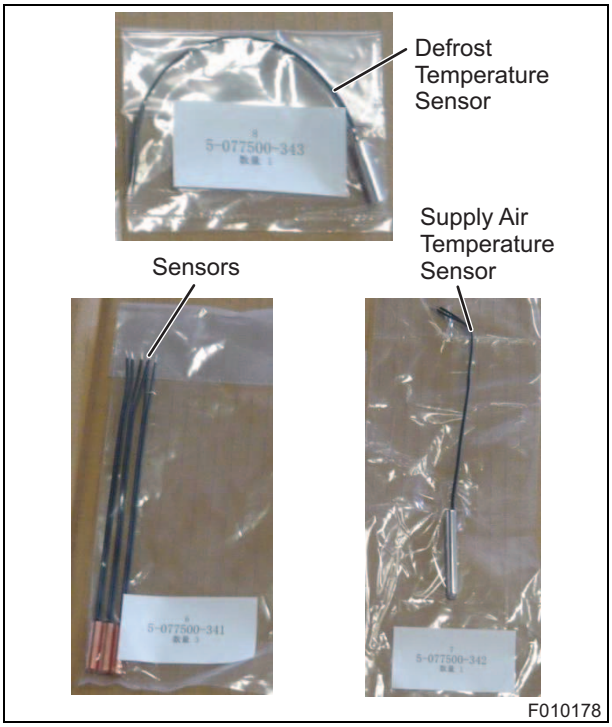
Part	Pressure Sensor
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the sensors by using the removal procedure in reverse order.
   Tightening torque: 10.0 (9.0 ~ 11.0) N·m

(7) Sensors

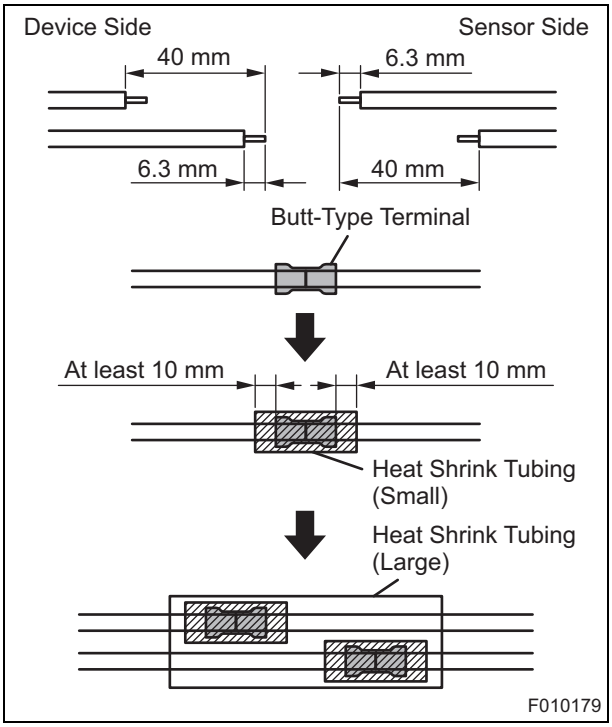
(Removal Procedure)



1) Remove the sensors by cutting the wires.

Part	Sensors
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	Butt type terminals, heat shrink tubing (large, small)
ATTENTION Items	-

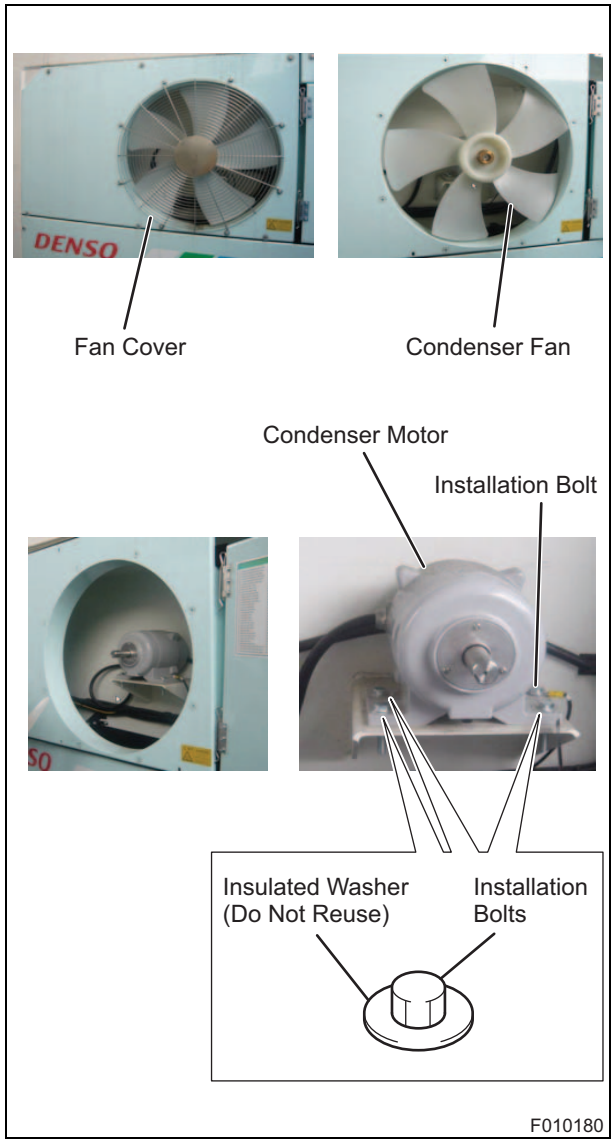
(Installation Procedure)



1) Prepare the sensor-side and device-side wires as shown in the figure above.
2) Place heat shrink tubing (large, small) over the device-side wires.
3) Use butt-type terminals to crimp the cut wires together.
4) Place heat shrink tubing (small) over the butt-type terminal connections, and then heat the tubing to shrink it in place.
5) Place the heat shrink tubing (large) over the two wires, and then use heat to shrink the tubing in place.

(8) Condenser Fan/Motor

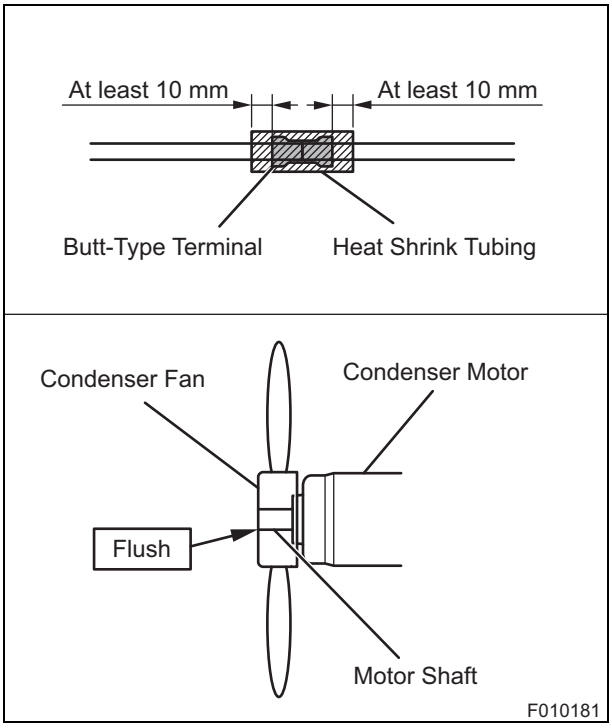
(Removal Procedure)



1) Remove the fan cover.
2) Use a pulley remover to remove the fan.
3) Disconnect the condenser motor contactor terminals inside the electric box, and then cut the sensing cord.
4) Remove the motor cord from the electric box.
5) Remove the motor installation bolts and the insulated washers.

Part	Condenser Fan/ Motor
Refrigerant Recovery	Not required
Special Tools	Pulley remover
Other Required Parts	Insulated washers, butt-type terminal, heat shrink tubing
ATTENTION Items	• Do not reuse the insulated washers. • Make the motor shaft flush with the edge of the fan. • Adjust the clearance between the fan and the shroud to between 3 mm and 5 mm.

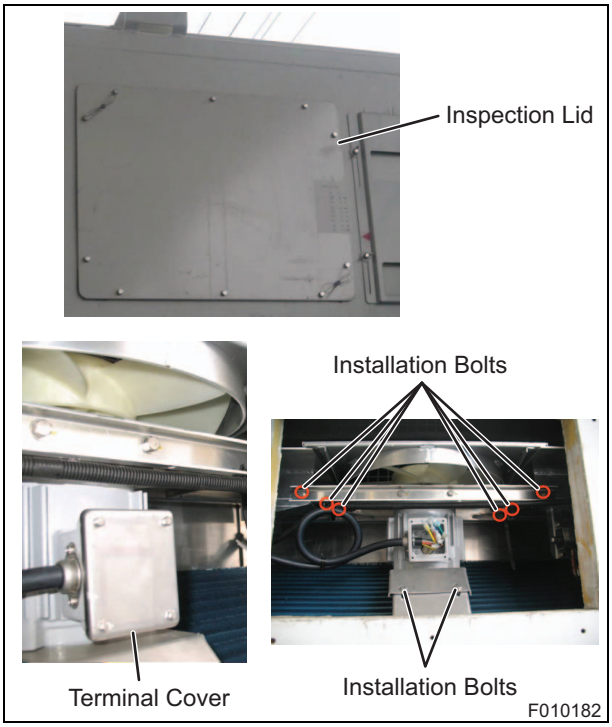
(Installation Procedure)



1) Use insulated washers and bolts to install the motor.
   Tightening torque: 12.0 (8.4 ~ 15.6) N·m
2) Insert the wires into the heat shrink tubing.
3) Use butt-type terminals to crimp the cut wires together.
4) Place heat shrink tubing over the butt-type terminal connections, and then heat the tubing to shrink it in place.
5) Attach the fan to the motor shaft.
   Tightening torque: 9.3 (7.4 ~ 10.2) N·m
6) Attach the fan cover.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m
7) Insert the motor wires into the electric box.
8) Connect the wires to the condenser motor contactor terminals.

(9) Cooling Fan/Motor

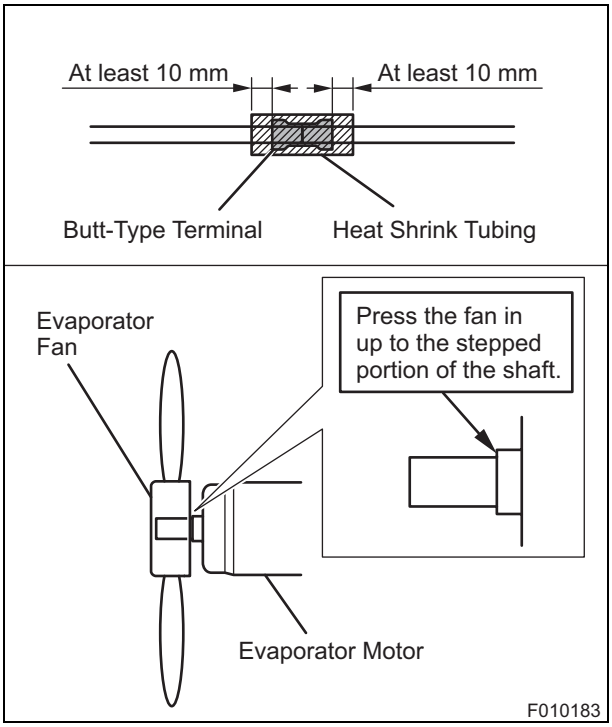
(Removal Procedure)



1) Open the inspection lid.
2) Open the terminal cover.
3) Cut the wires.
4) Remove the installation bolts.
5) Remove the fan and the motor.

Part	Cooling Fan/ Motor
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	Butt type terminals, heat shrink tubing
ATTENTION Items	• Adjust the clearance between the fan and the shroud to between 3 mm and 5 mm. • When assembling the fan and the motor, press the motor shaft in up to the stepped portion of the shaft.

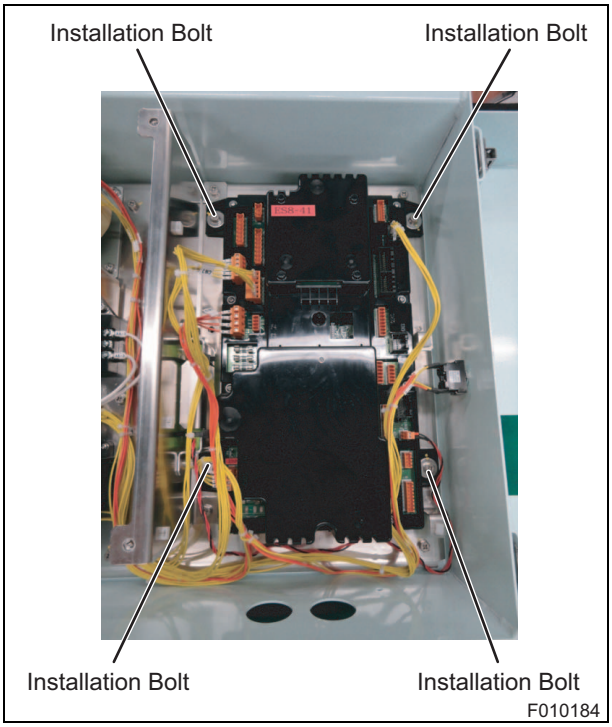
(Installation Procedure)



1) Attach the fan to the motor.
   Tightening torque: 9.3 (7.4 ~ 10.2) N·m
2) Attach the motor and fan.
   Tightening torque: 12.0 (8.4 ~ 15.6) N·m
3) Insert the wires into the heat shrink tubing.
4) Use butt-type terminals to crimp the cut wires together.
5) Place heat shrink tubing over the butt-type terminal connections, and then heat the tubing to shrink it in place.
6) Attach the terminal cover.
   Tightening torque: 1.8 (1.3 ~ 2.3) N·m
7) Attach the inspection lid.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m

(10) Main ECU

(Removal Procedure)



1) Disconnect all of the connectors.

2) Remove the installation bolts.

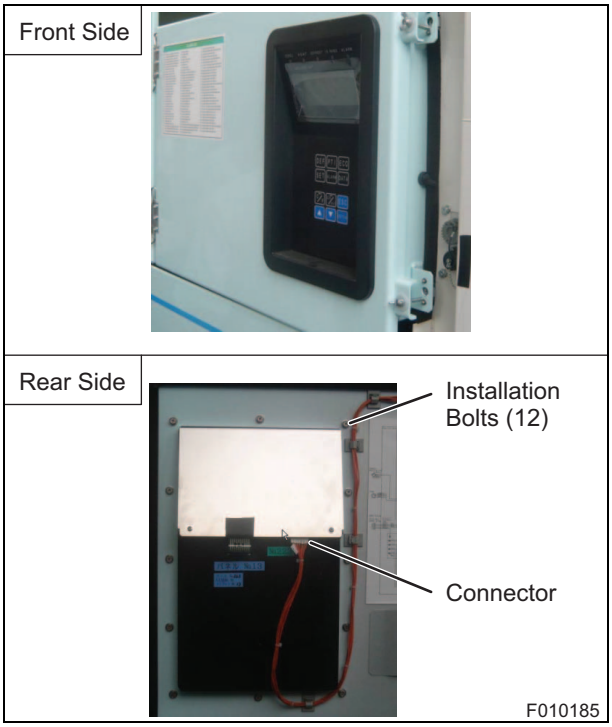
Part	Main ECU
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the main ECU by using the removal procedure in reverse order.
   Tightening torque: 4.7 (4.2 ~ 5.2) N·m

(11) Control Panel

(Removal Procedure)



1) Disconnect connector CN24.
2) Remove the installation bolts.

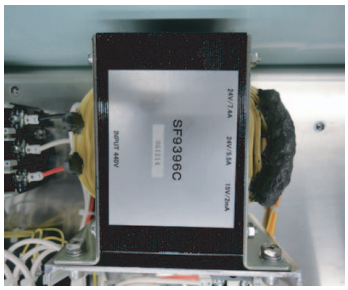
Part	Control Panel
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the control panel by using the removal procedure in reverse order.
   Tightening torque: 2.6 (2.3 ~ 2.8) N·m

(12) Transformer

(Removal Procedure)



1) Disconnect each terminal.
2) Remove the installation bolts.

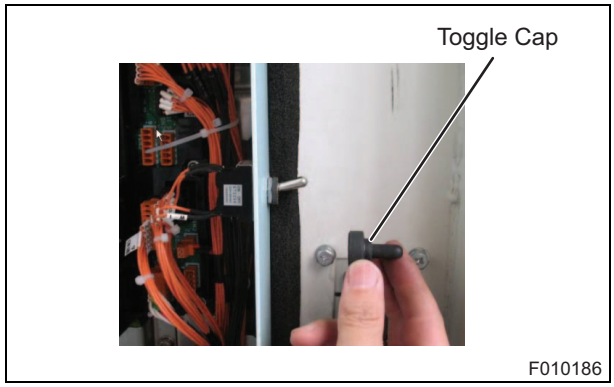
Part	Transformer
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the transformer by using the removal procedure in reverse order.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m

(13) Toggle Switch

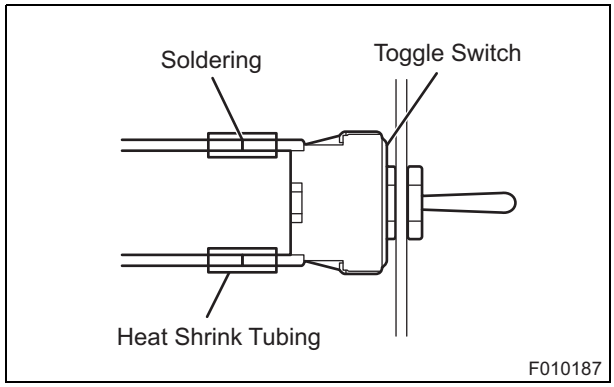
(Removal Procedure)



1) Remove the toggle cap.
2) Disconnect each terminal.
3) Remove the installation nut.

Part	Toggle Switch
Refrigerant Recovery	Not required
Special Tools	Soldering tool
Other Required Parts	Heat shrink tubing
ATTENTION Items	-

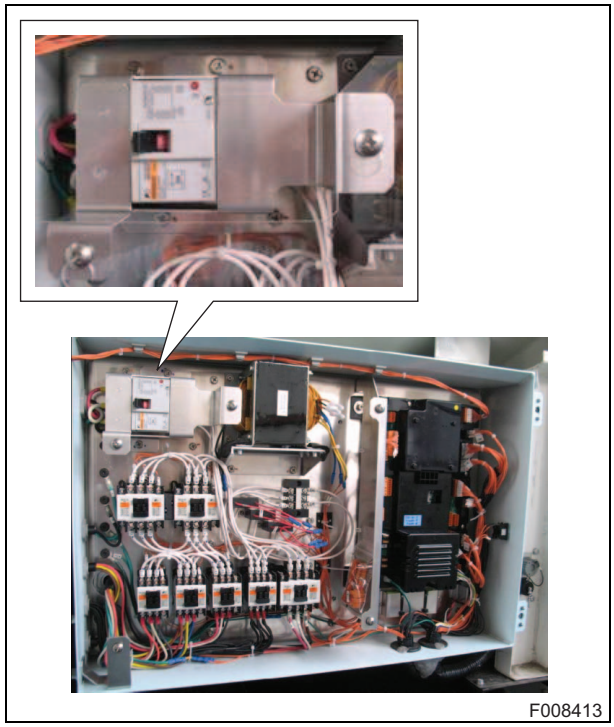
(Installation Procedure)



1) Insert the wires into the heat shrink tubing.
2) Solder each connection terminal.
3) Attach the toggle switch.
   Nut tightening torque: 1.2 (1.0 ~ 1.4) N·m

(14) Circuit Breaker

(Removal Procedure)



1) Remove the cover.
2) Disconnect each terminal.
3) Remove the installation screws.

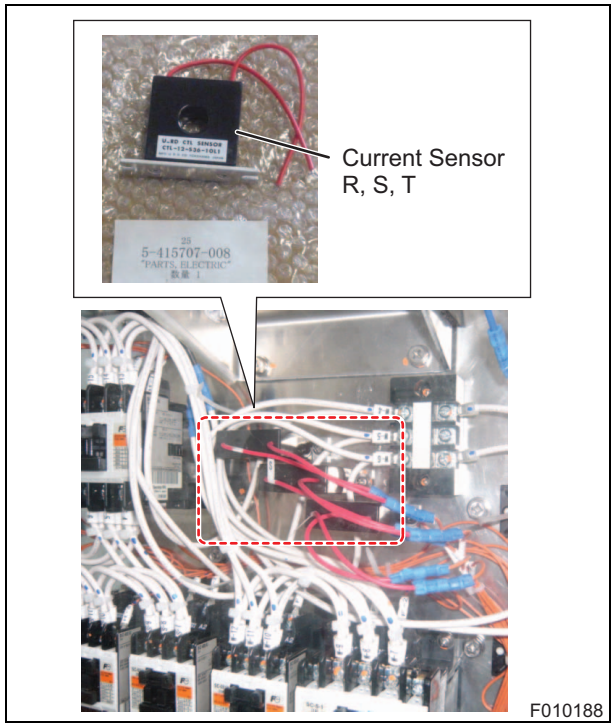
Part	Circuit Breaker
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the circuit breaker by using the removal procedure in reverse order.
   Tightening torque: 1.8 (1.3 ~ 2.3) N·m

(15) Current Sensors R, S, T

(Removal Procedure)

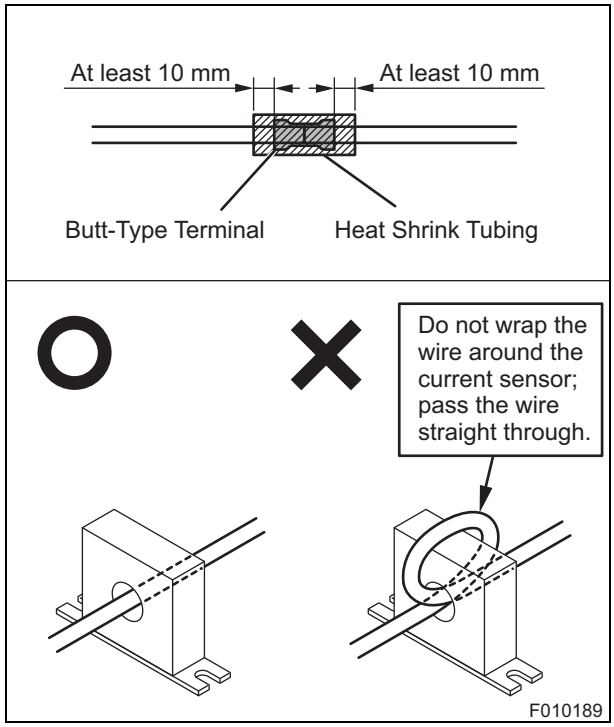


1) Cut the cords.

2) Remove the installation screws.

Part	Current Sensors R, S, T
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	Butt type terminals, heat shrink tubing
ATTENTION Items	-

(Installation Procedure)

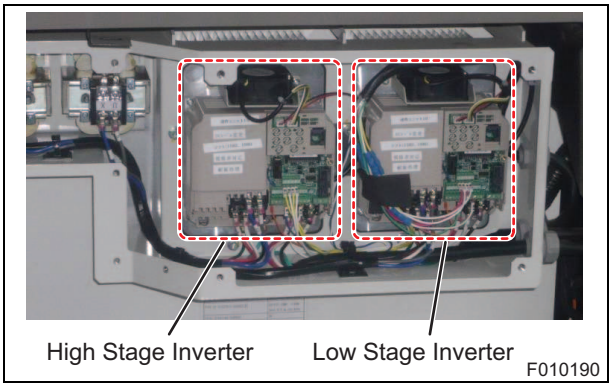

At least 10 mm
At least 10 mm
Butt-Type Terminal
Heat Shrink Tubing
Do not wrap the wire around the current sensor; pass the wire straight through.
F010189

1) Place heat shrink tubing over the wires, and then use butt-type terminals to make the connections.

2) Attach the current sensors.
Tightening torque: 1.8 (1.3 ~ 2.3) N·m

(16) Inverters

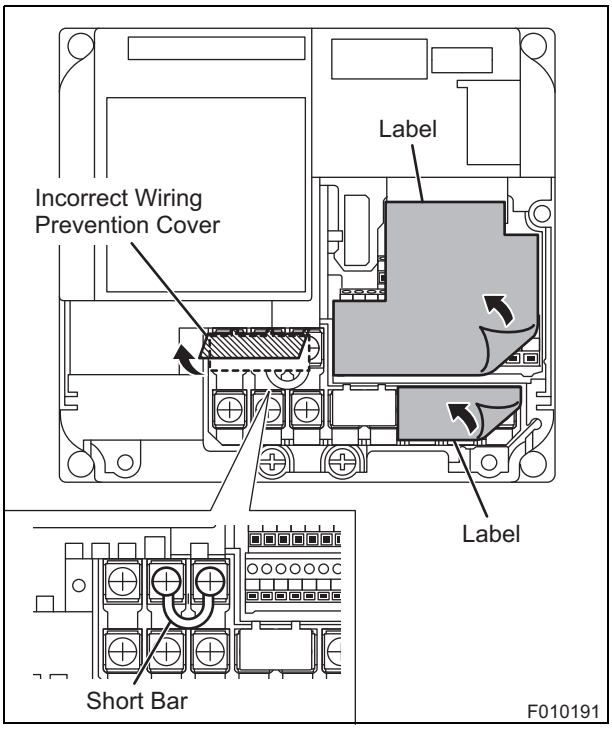
(Removal Procedure)



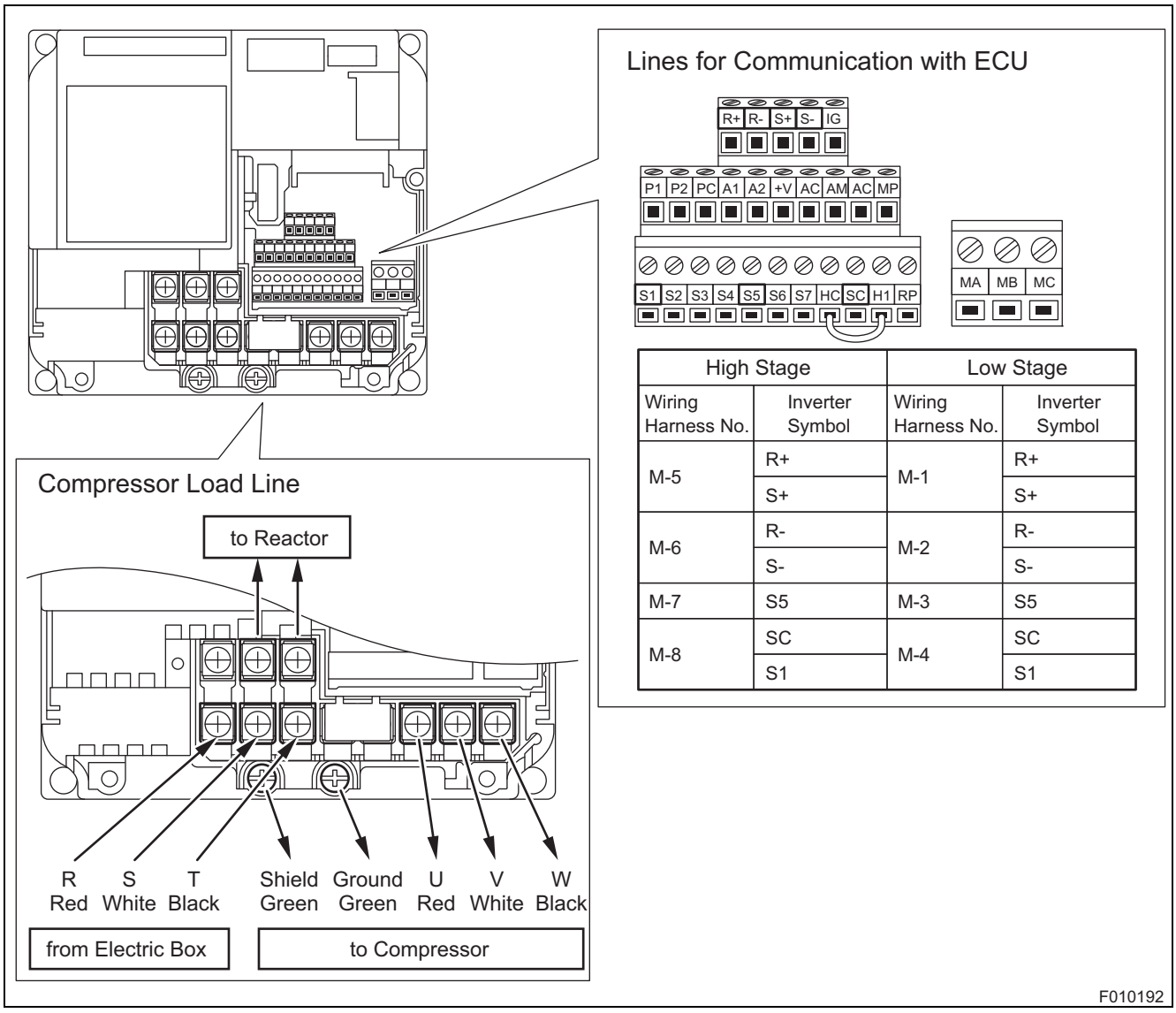
1) Remove the inverter case installation bolts.
2) Remove the inverter case cover.
3) Disconnect the inverter cords.
4) Remove the inverter installation bolts.

Part	Inverter
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	Packing, waterproof washers
ATTENTION Items	• Do not reuse the packing for the inverter case cover or the waterproof washers. • Use caution, as if the cord to the compressor is incorrectly connected, the compressor will rotate in reverse.

(Installation Procedure)



1) Cut off the incorrect wiring prevention cover attached to the reactor connection terminal block with a pair of nippers.
2) Remove the short bar attached to the reactor terminal block.
3) Remove the labels attached to the communication sensor terminal block and the compressor connection terminal block.



High Stage		Low Stage	
Wiring Harness No.	Inverter Symbol	Wiring Harness No.	Inverter Symbol
M-5	R+	M-1	R+
	S+		S+
M-6	R-	M-2	R-
	S-		S-
M-7	S5	M-3	S5
M-8	SC	M-4	SC
	S1		S1

4) Install the inverters by using the removal procedure in reverse order.

Inverter case tightening torque

: 12.0 (8.4 ~ 15.6) N·m

Inverter unit tightening torque

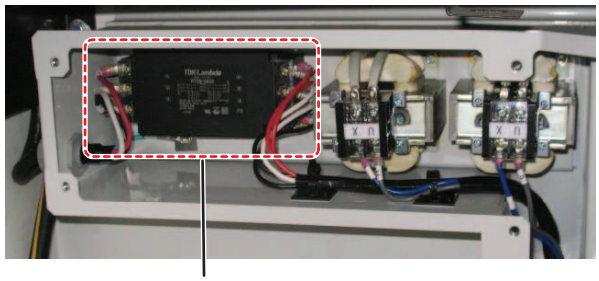
: 5.0 (3.5 ~ 6.5) N·m

Inverter case cover tightening torque

: 5.0 (3.5 ~ 6.5) N·m

(17) Noise Filter

(Removal Procedure)



1) Remove the inverter cover.
2) Disconnect the cord.
3) Remove the installation bolts.

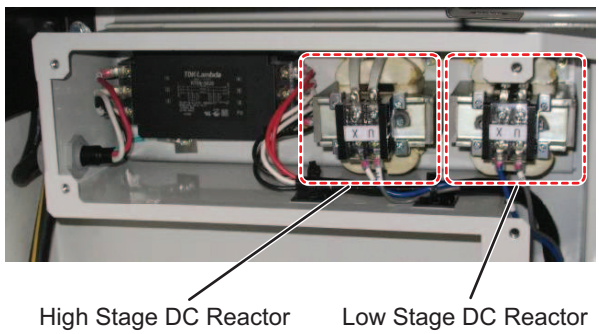
Part	Noise Filter
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the noise filter by using the removal procedure in reverse order.
   Installation bolt tightening torque: 1.8 (1.3 ~ 2.3) N·m

(18) Reactors

(Removal Procedure)



1) Remove the inverter cover.
2) Disconnect the cords.
3) Remove the installation bolts.

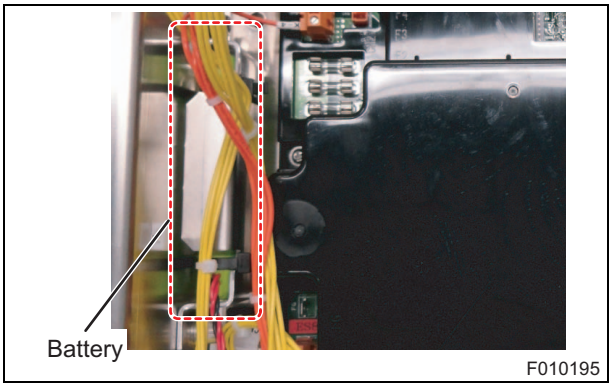
Part	Reactor
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the reactors by using the removal procedure in reverse order.
   Installation bolt tightening torque: 1.8 (1.3 ~ 2.3) N·m

(19) Battery

(Removal Procedure)



1) Disconnect the connectors.

2) Remove the bracket.

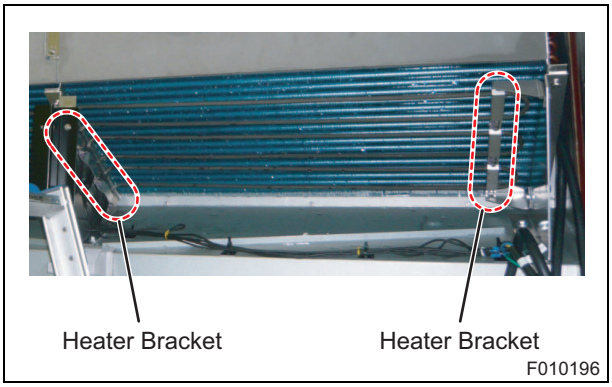
Part	Battery
Refrigerant Recovery	Not required
Special Tools	Hexagonal nut
Other Required Parts	-
ATTENTION Items	-

(Installation Procedure)

1) Install the battery by using the removal procedure in reverse order.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m

(20) Heater

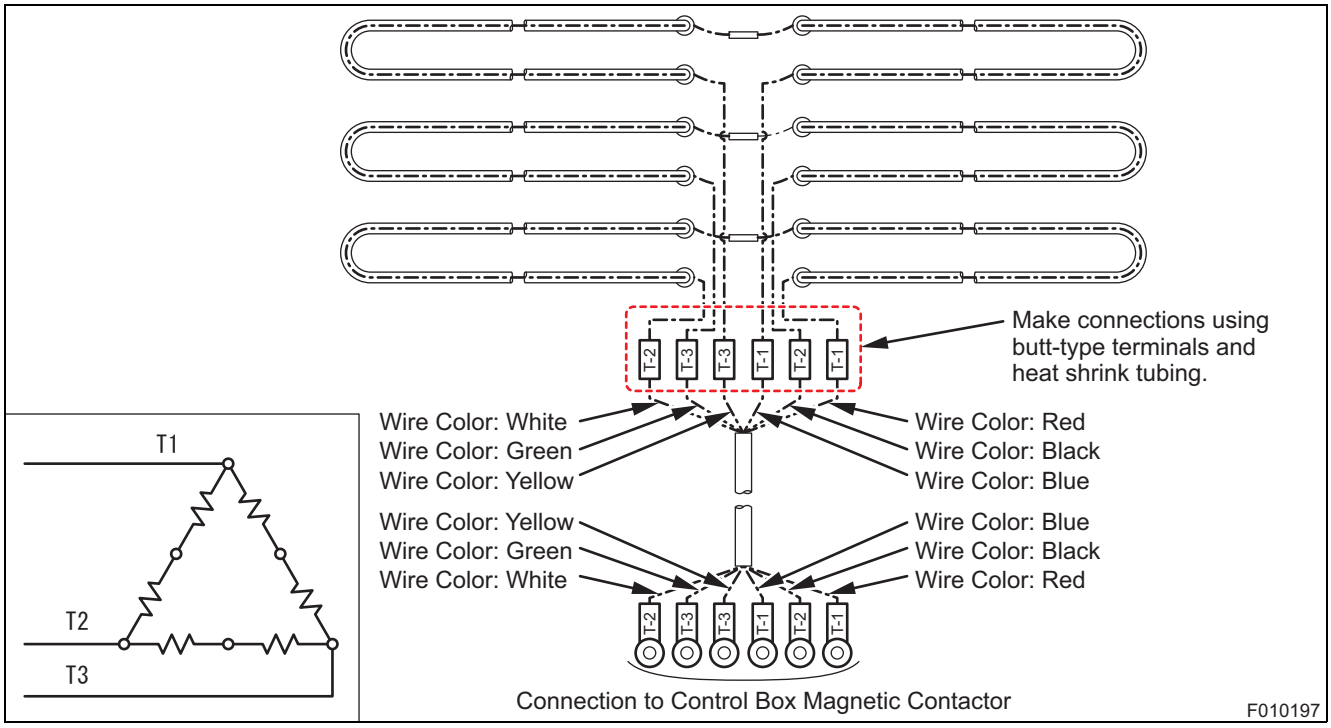
(Removal Procedure)



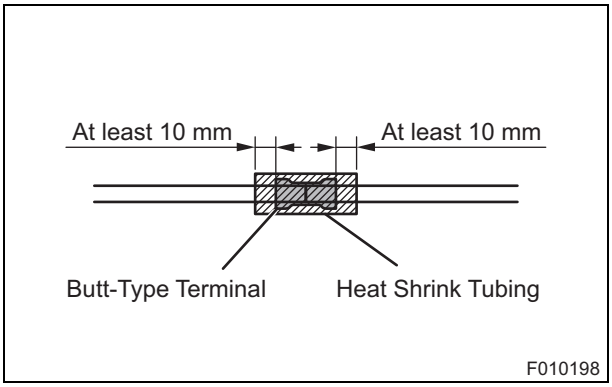
1) Remove the heater brackets.
2) Cut the heater wires.

Part	Heater
Refrigerant Recovery	Not required
Special Tools	-
Other Required Parts	Butt type terminals, heat shrink tubing
ATTENTION Items	Do not confuse the wire colors.

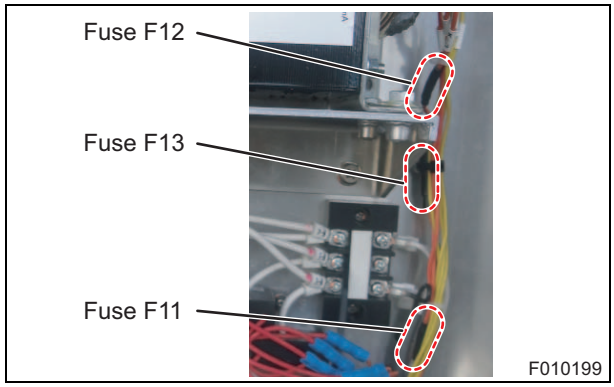
(Installation Procedure)



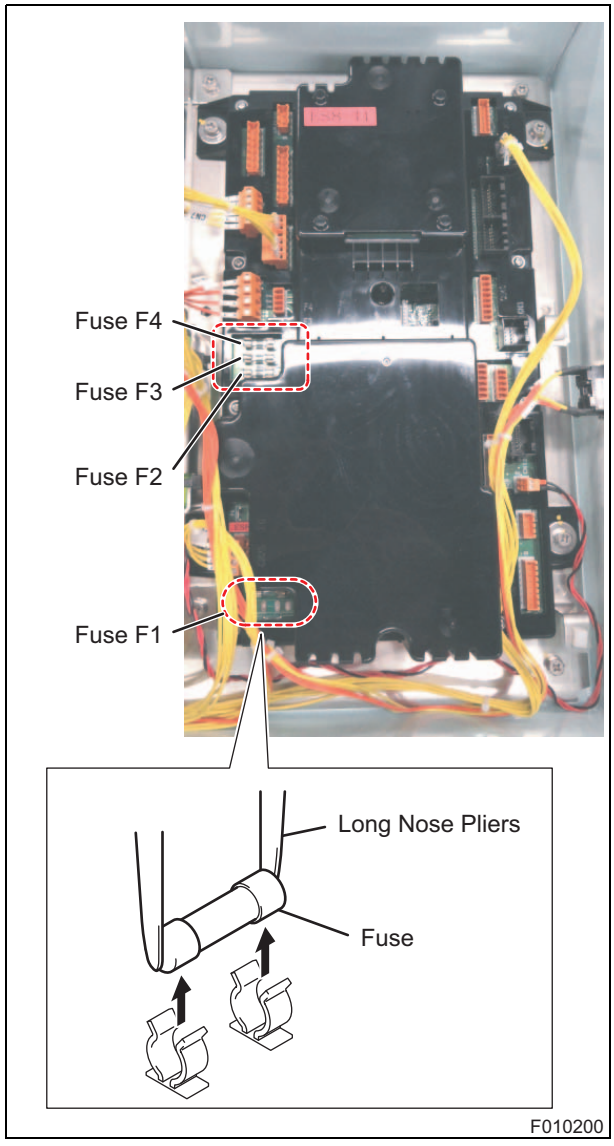
1) Insert the wires into the heat shrink tubing.
2) Use butt-type terminals to crimp the cut wires together.
3) Place heat shrink tubing over the butt-type terminal connections, and then heat the tubing to shrink it in place.
4) Attach the heater brackets.
   Tightening torque: 5.0 (3.5 ~ 6.5) N·m



(21) Fuses



(Removal Procedure)



1) Remove the fuses with long nose pliers.

(Installation Procedure)

1) Install the fuses gently by hand; do not use tools.

6. Refrigerant Recovery and Charging Method

6.1 CAUTION Items for Refrigerant Handling

- The following explains the refrigerant (R404A) handling procedures.

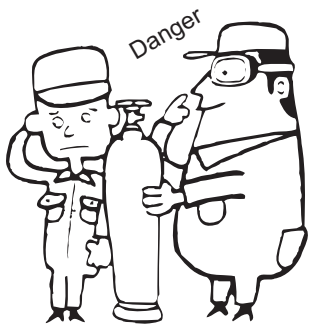
< ATTENTION >

The release of refrigerant to the atmosphere is strictly prohibited by law. Do not release refrigerant to the atmosphere. Always use a refrigerant recovery device to remove refrigerant from the cycle. R404A cannot be reused; request that a Freon recovery specialist handle R404a refrigerant disposal.

(1) CAUTION Items for Refrigerant Charging (Safety)

Work by anyone other than an expert is strictly prohibited.

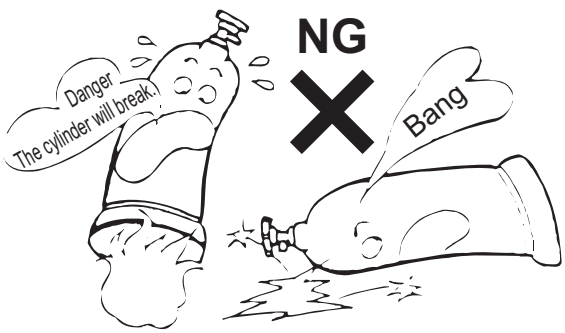
- There are a number of dangers in refrigerant charging work associated with handling high-pressure gas. Always have an expert perform charging work.



F007742

CAUTION Items for Storage and Handling of Refrigerant Cylinders (or Service Cans)

- Store refrigerant cylinders in a dry, dark location.
- Do not store refrigerant cylinders in locations where the refrigerant temperature may become excessively high such as near an open flame, in direct sunlight, or inside a vehicle (including the trunk).
- Do not topple or drop refrigerant cylinders.



F007743

Do not work with the refrigerant cylinder in close proximity to a person's face.

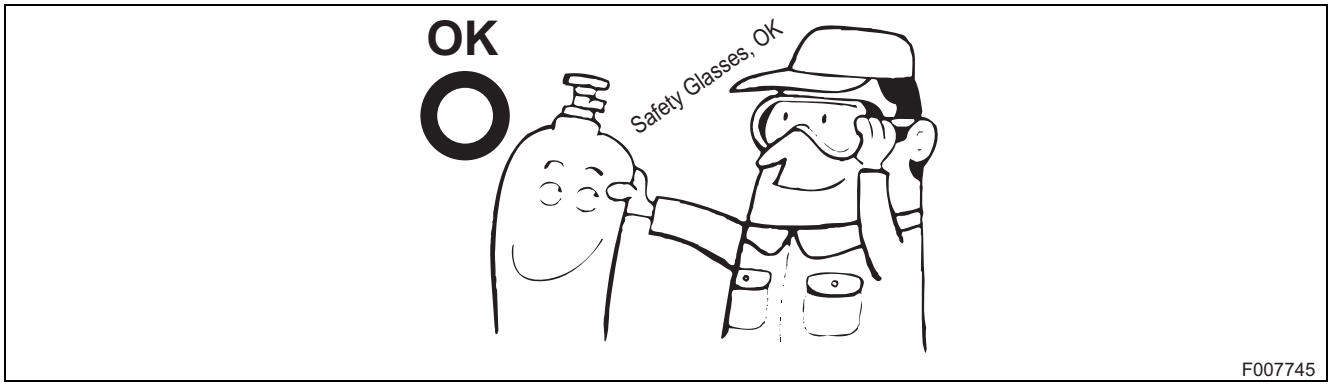
- Never attach the gauge manifold or charging hoses with the refrigerant cylinder near a person's face.

  Accidental discharge of liquid refrigerant may lead to serious bodily injury.

Always wear safety glasses.

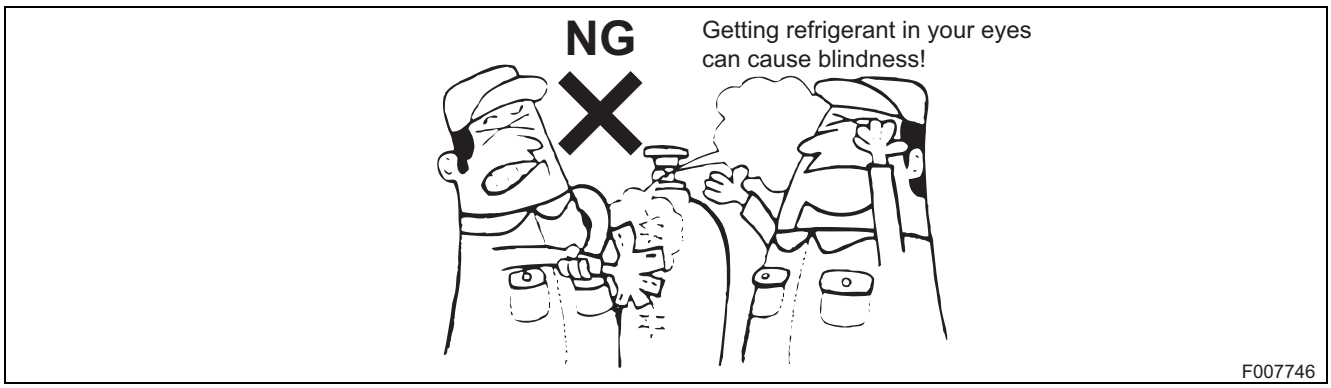
- Always wear safety glasses when charging refrigerant. If refrigerant enters the eye, moisture within the eye may freeze, causing blindness.

  In addition, there is a danger of frostbite if liquid refrigerant comes in contact with the hands. Always use sufficient caution.



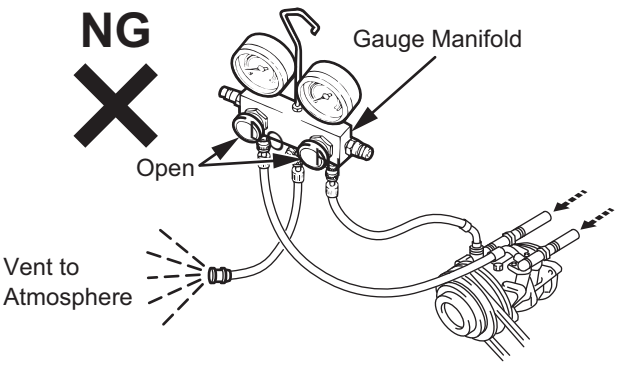
Treatment if Refrigerant Enters the Eyes

- Do not rub the affected eye with hands or a handkerchief.
- Immediately flush the affected eye with clean water.
- Seek medical attention from an ophthalmologist (specialist eye doctor).



Removing Refrigerant from the Refrigeration Cycle

- Do not release refrigerant to the atmosphere. Always use a refrigerant recovery device to remove refrigerant from the cycle.

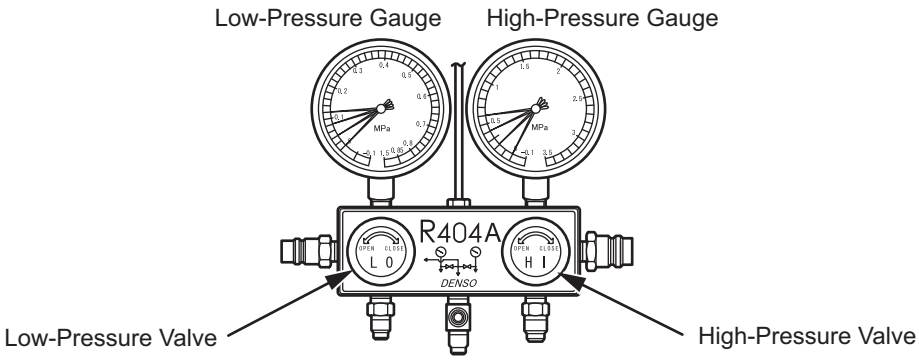


F007747

(2) CAUTION Items for Charging R404A Refrigerant (Service)

Gauge Manifold Handling

- Use the special gauge manifold for R404A refrigerant.



F007748

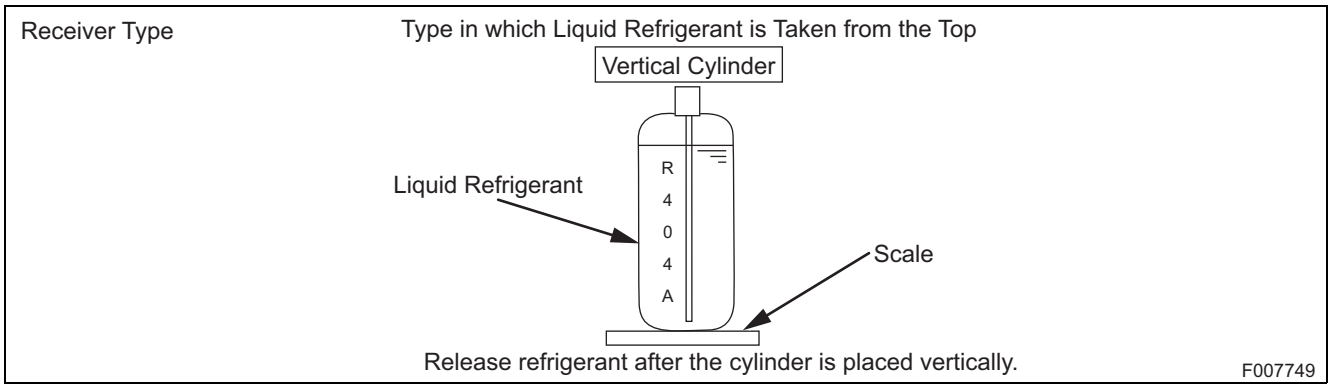
Refrigerant Handling

- Do not use an R404A refrigerant cylinder that is laying horizontally or inverted.
  (The R404A cylinder is a receiver type, structured so that the liquid refrigerant comes out of the valve when the cylinder is positioned vertically.)
- Always charge R404A refrigerant in a liquid state.
- Always use R404A refrigerant cylinders with a scale (accuracy: ±10 g) to ensure accurate charging.

< ATTENTION >

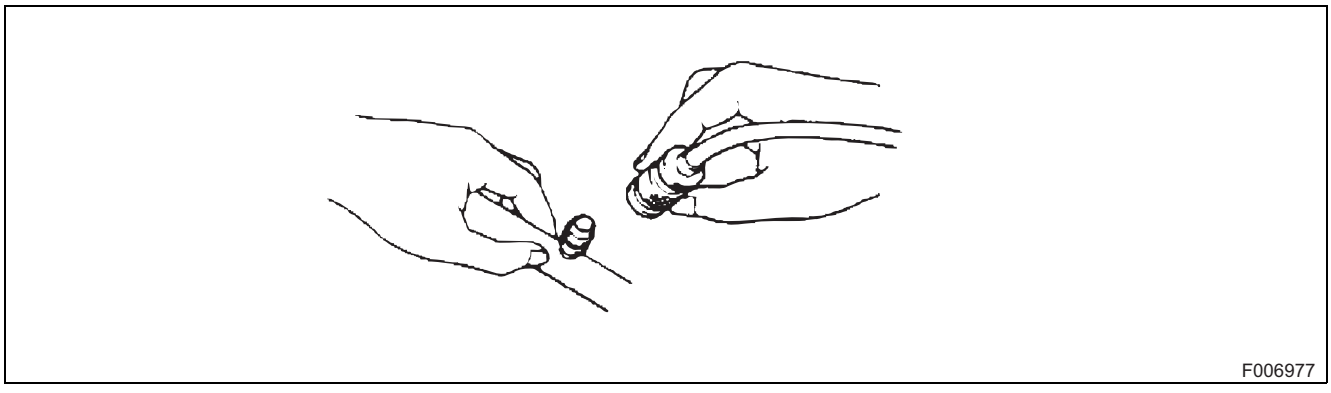
Never charge refrigerant above the specified quantity.

If refrigerant is overcharged (by +50 g or more), remove all of the refrigerant from the cycle, perform evacuation once again, and then begin recharging. Do not release refrigerant to the atmosphere; always use a refrigerant recovery device to remove refrigerant from the cycle. R404A cannot be re-used; request that a Freon recovery specialist handle R404a refrigerant disposal.



Quick Joint Connections

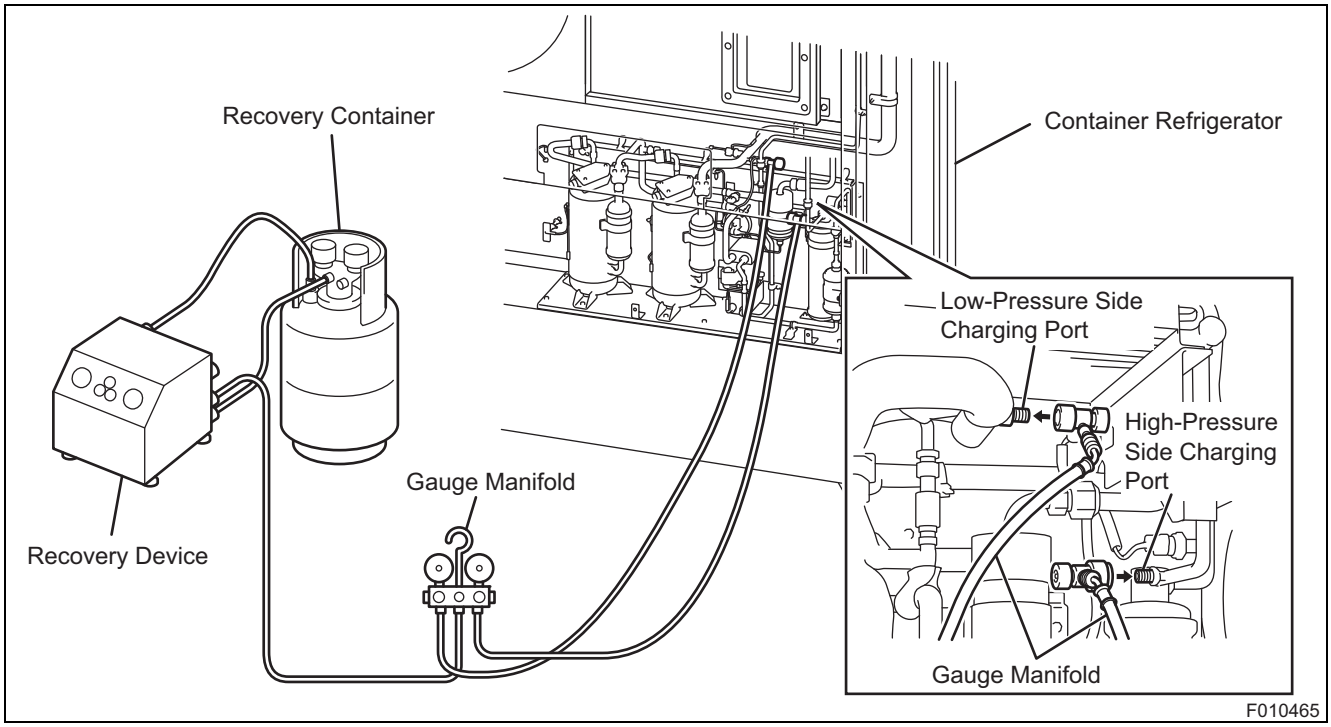
- Refrigerant pressure is very high. Firmly attach the quick joints with two hands to ensure proper connection.



6.2 Refrigerant Recovery Method

(1) CAUTION Items for Recovery Work

- Recover the refrigerant from the high-pressure side to prevent refrigeration machine oil from entering the recovery device.
- To ensure that all of the refrigerant is recovered, when the high-pressure side pressure drops to 0.1 MPa or lower, recover the refrigerant from the low-pressure side.
- In circumstances other than the aforementioned, conduct work in accordance with the refrigerant recovery device owner's manual.



6.3 Refrigerant Charging Method

(1) Refrigerant Charging Procedure

Evacuation

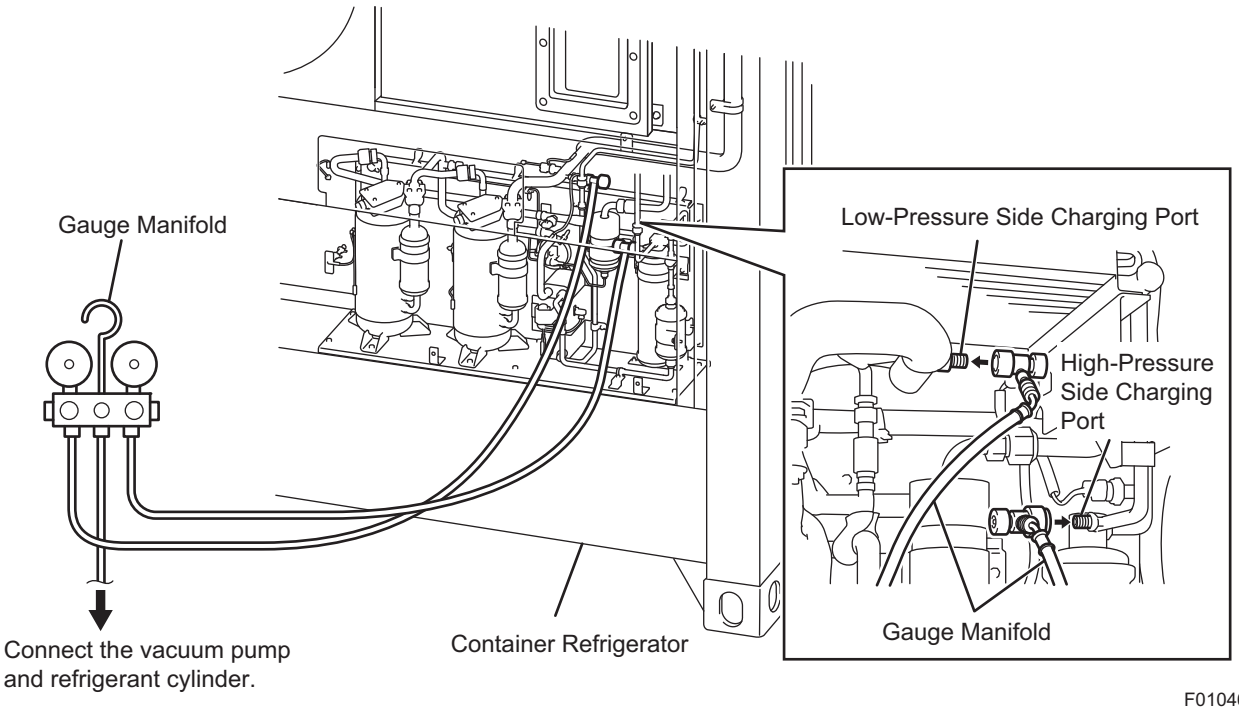
Refrigerant Charging

- Charging from High-Pressure Side
- Charging from Low-Pressure Side (When Charging from the High-Pressure Side is Not Possible)

Refrigerant Charging Quantity Verification

Gas Leak Check

Refrigerant Charging Quantity: 6.30 ± 0.05 kg

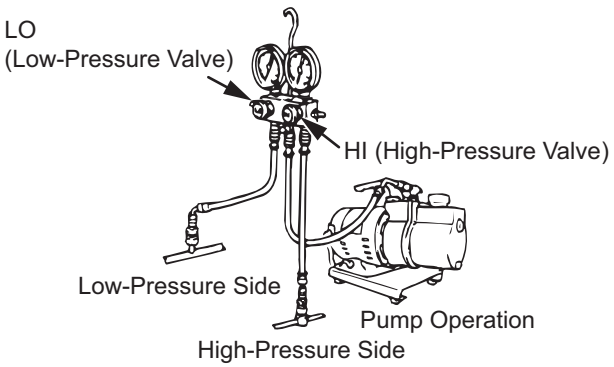


F010466

(2) Evacuation

1) Disconnect the center hose (yellow) on the gauge manifold from the regulator, and then connect the hose to the vacuum pump (two-stage).

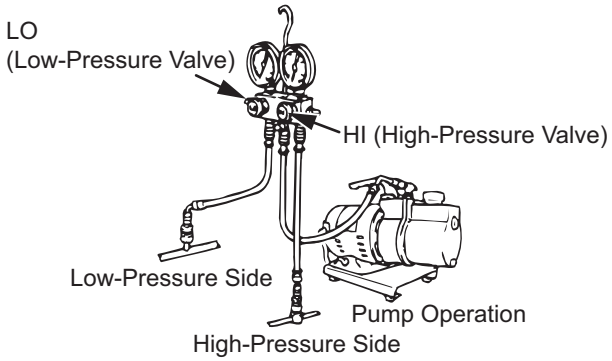
2) Start evacuation by running the vacuum pump and opening the high and low-pressure valves on the gauge manifold.



Gauge Manifold
HI : Open
LO : Open

F007754

3) Perform evacuation for at least 60 minutes. When the dial on the low-pressure gauge reaches -0.1 MPa (-750 mmHg), close the high and low-pressure valves on the gauge manifold, and turn the vacuum pump switch OFF.



Gauge Manifold
HI : Closed
LO : Closed

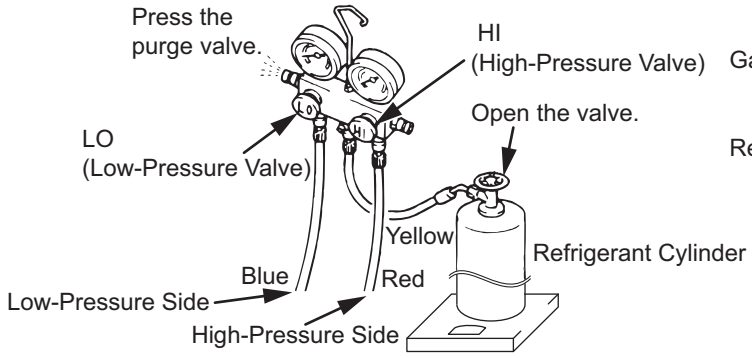
F010467

(3) Refrigerant Charging (Charging from the High-Pressure Side)

1) Disconnect the center hose (yellow) connected to the vacuum pump, and then connect the hose to the refrigerant cylinder (or service can).

[ADVICE]
- Manage the refrigerant quantity by placing the refrigerant cylinder on a scale with an accuracy of ±10 g.
- Leave the engine OFF.

2) Evacuate any air from inside the hose by opening the refrigerant cylinder valve, and then pressing the purge valve on the gauge manifold.



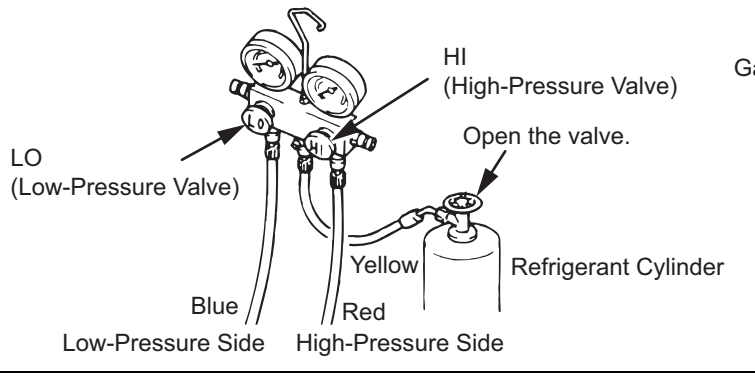
3) Open the gauge manifold high-pressure valve to begin charging liquid refrigerant.

4) Charge the specified quantity of refrigerant, and then close the high-pressure valve and the refrigerant cylinder valve.

< ATTENTION >

Always charge the refrigerant in a liquid state.

- When the specified quantity of refrigerant cannot be charged from the high-pressure side, charge from the low-pressure side.



(4) Refrigerant Charging (Charging from the Low-Pressure Side)

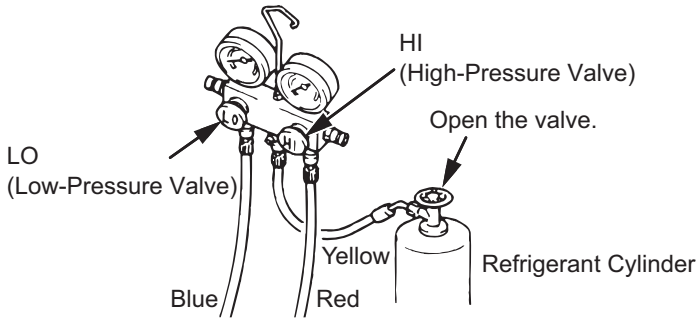
- When the specified quantity of refrigerant cannot be charged from the high-pressure side, run the transport refrigerator and charge from the low-pressure side.

1) Start the vehicle engine, and while idling, start the transport refrigerator.

2) Open the refrigerant cylinder valve, then repeatedly open and close the low-pressure valve until the specified quantity of refrigerant is charged.

< ATTENTION >

- **Since liquid refrigerant is also charged from the low-pressure side, always repeatedly and slowly open and close the low-pressure valve.**
  - ✓ **Opening the valve too quickly may lead to compressor damage due to liquid compression.**

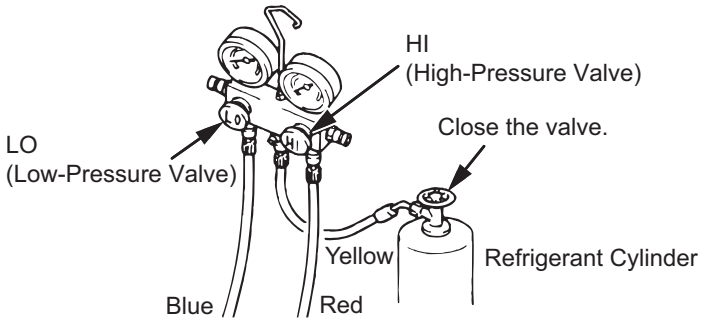


Gauge Manifold
HI : Left Closed
LO : Open "slowly" only a "slight" amount
Refrigerant Cylinder Valve : Open

Never open the high-pressure side.

F010472

3) When charging is complete, close the gauge manifold and refrigerant cylinder valves.



Gauge Manifold
HI : Left Closed
LO : Closed
Refrigerant Cylinder Valve : Close

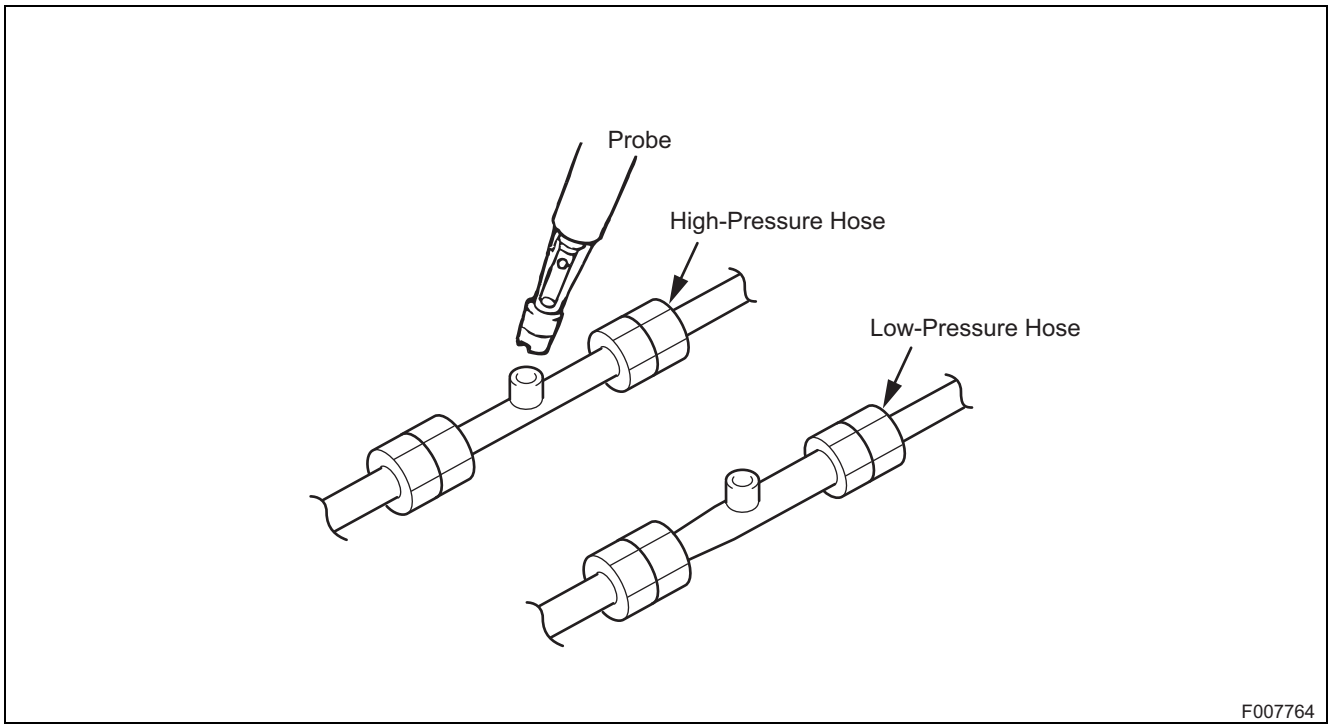
F010473

(5) Refrigerant Charging Quantity Verification

- When charging is complete, run the transport refrigerator at 2°C or -18°C until operation stabilizes.
- Verify the normal operating range using the operating current/pressure graph.

(6) Gas Leak Check

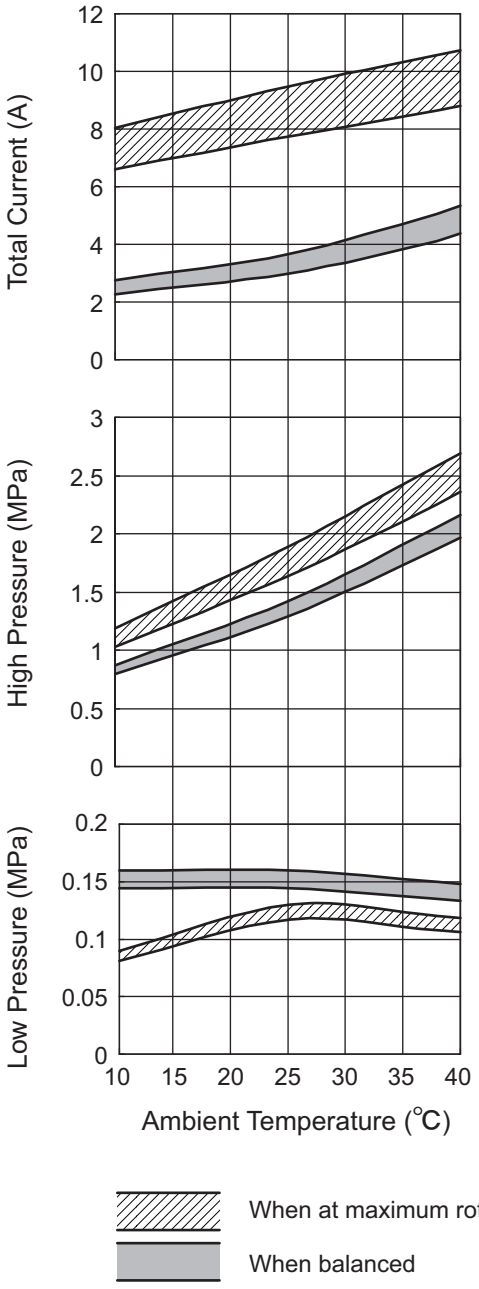
- Check for gas leaks from openings in the refrigeration cycle as well as the high and low-pressure charging ports using a gas leak tester.



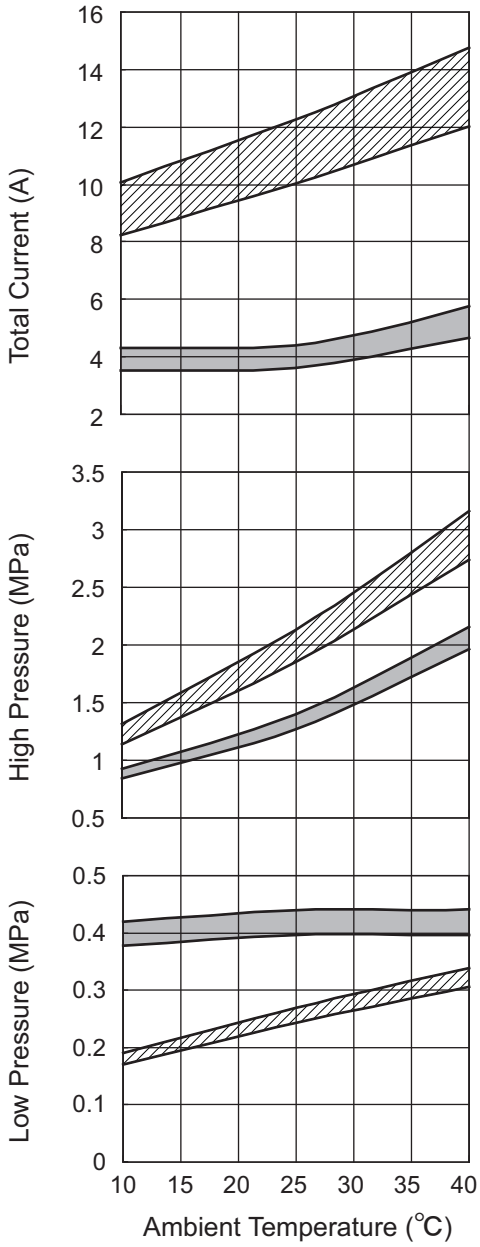
7. Operating Current/Pressure Graph

7.1 60 Hz

Compartment Temperature	-18℃
Power Supply	440 V 60 Hz
Eco-Mode	OFF



Compartment Temperature	2℃
Power Supply	440 V 60 Hz
Eco-Mode	OFF



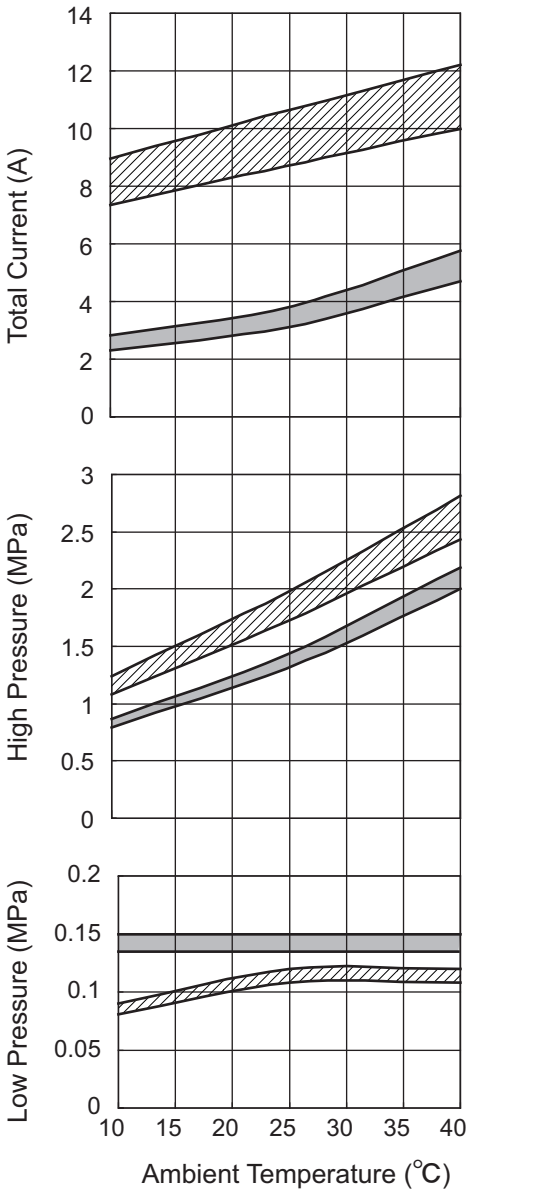
When at maximum rotation
When balanced

When at maximum rotation
When balanced

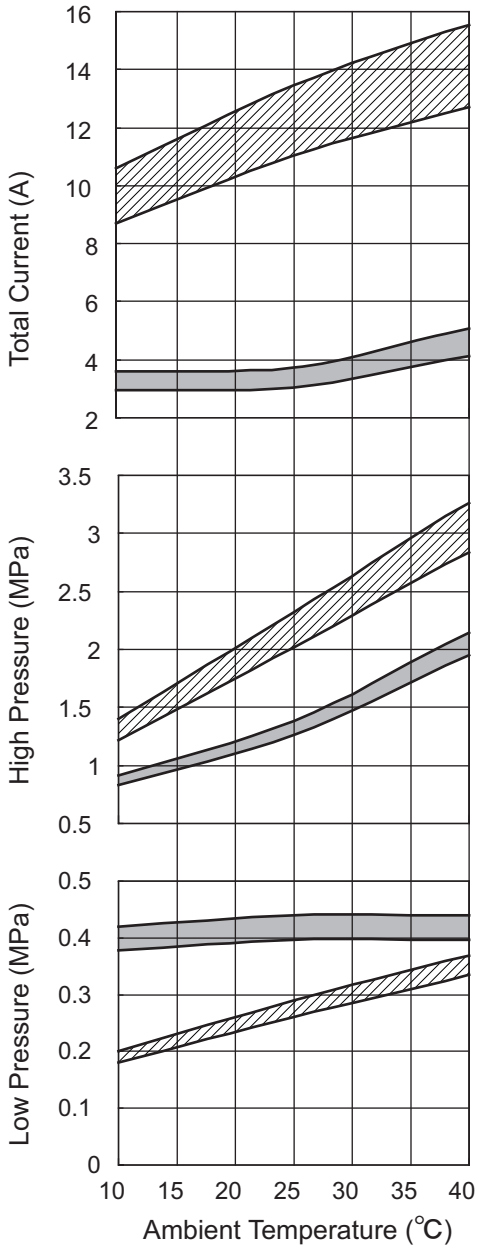
F010468

7.2 50 Hz

Compartment Temperature	-18℃
Power Supply	380 V 50 Hz
Eco-Mode	OFF



Compartment Temperature	2℃
Power Supply	380 V 50 Hz
Eco-Mode	OFF



When at maximum rotation

When balanced

When at maximum rotation

When balanced

F010469

8. Emergency Operation Method

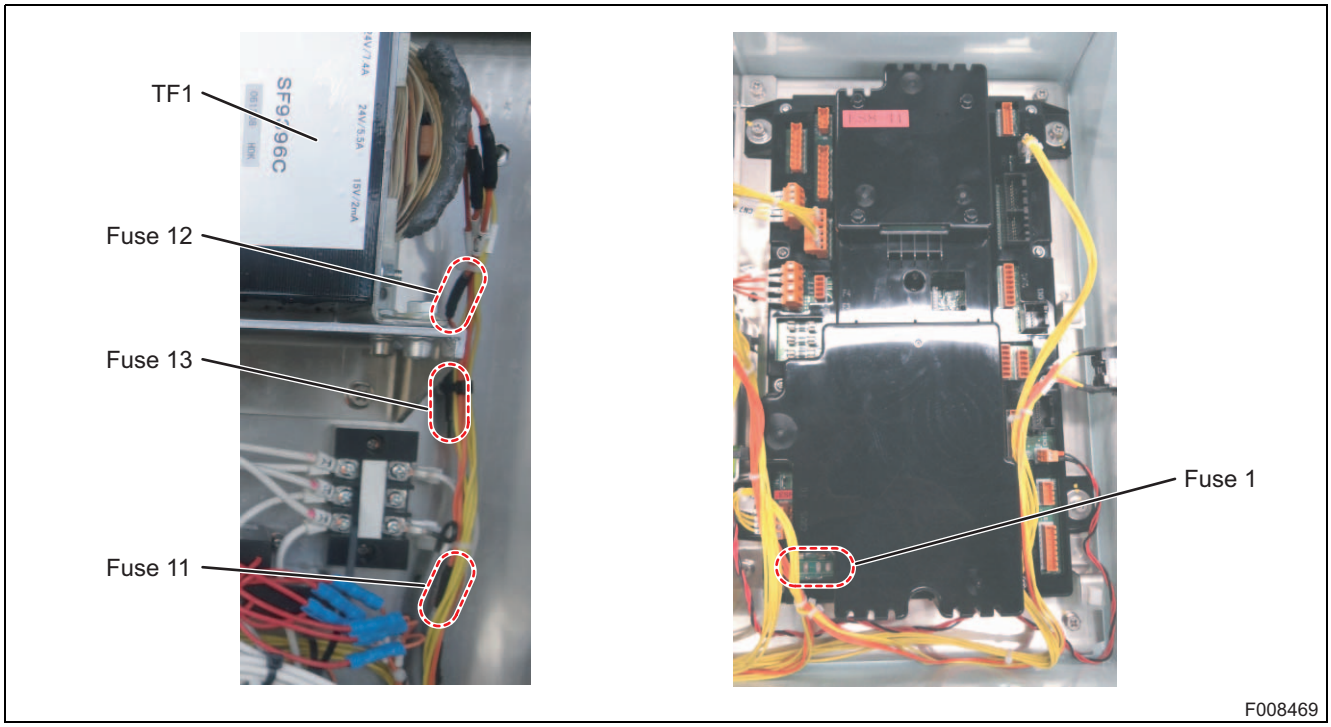
8.1 Determinations for Switching to Emergency Operation

- If the display panel does not illuminate and the reefer unit fails to start even though the unit ON/OFF switch is ON, the malfunction is most likely in the control panel. Replace the controller after verifying the items listed below. If there is no replacement controller, conduct emergency operations in accordance with the emergency operation procedure.

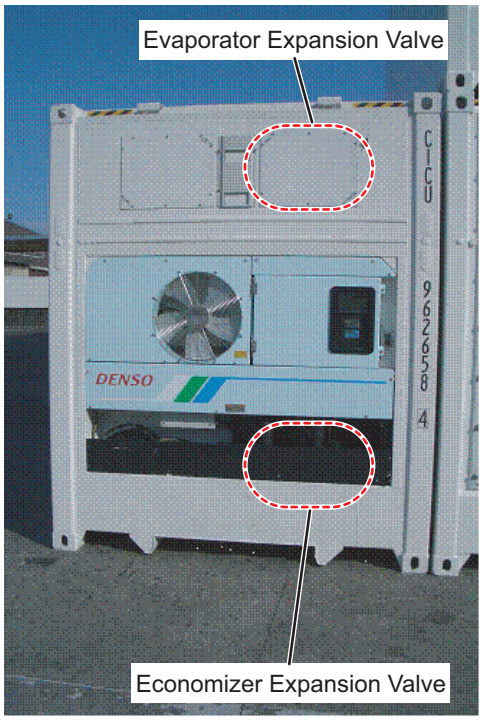
	Verification Items	Verification Content
1	Is power being supplied?	Verify that the power supply plug is connected. Check to see if the breaker is tripped.
2	Is power being supplied to the main ECU circuit board?	Check to see if the CN25, CN15 connectors are disconnected. Verify with a tester. CN25(3-4):16.1 V ~ 29.9 V; CN15(1-3, 2-4):16.8 V ~ 31.2 V
3	Is the wiring harness for the display panel connected?	Check to see if the CN24 or the panel-side connector are disconnected.
4	Check for blown fuses.	Check to see if the two fuses(F1, F11) are blown. (Other fuses are checked by ECU, if ECU is working)

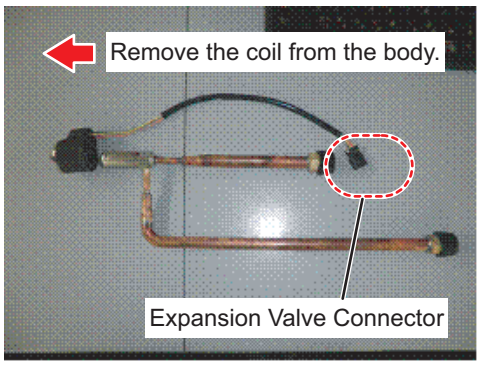
- When a Fuse is Blown

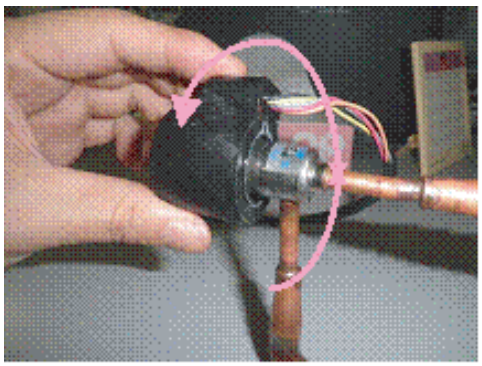
Fuse Name	Rating	Protected Location	Action
F1 (23 V line)	8 A	ECU internal	(1) Replace fuse. (2) Replace ECU.
F11 (TF1:24V line)	10 A	ECU external	



8.2 Emergency Operation Procedure (Expansion Valve-Side Preparation)



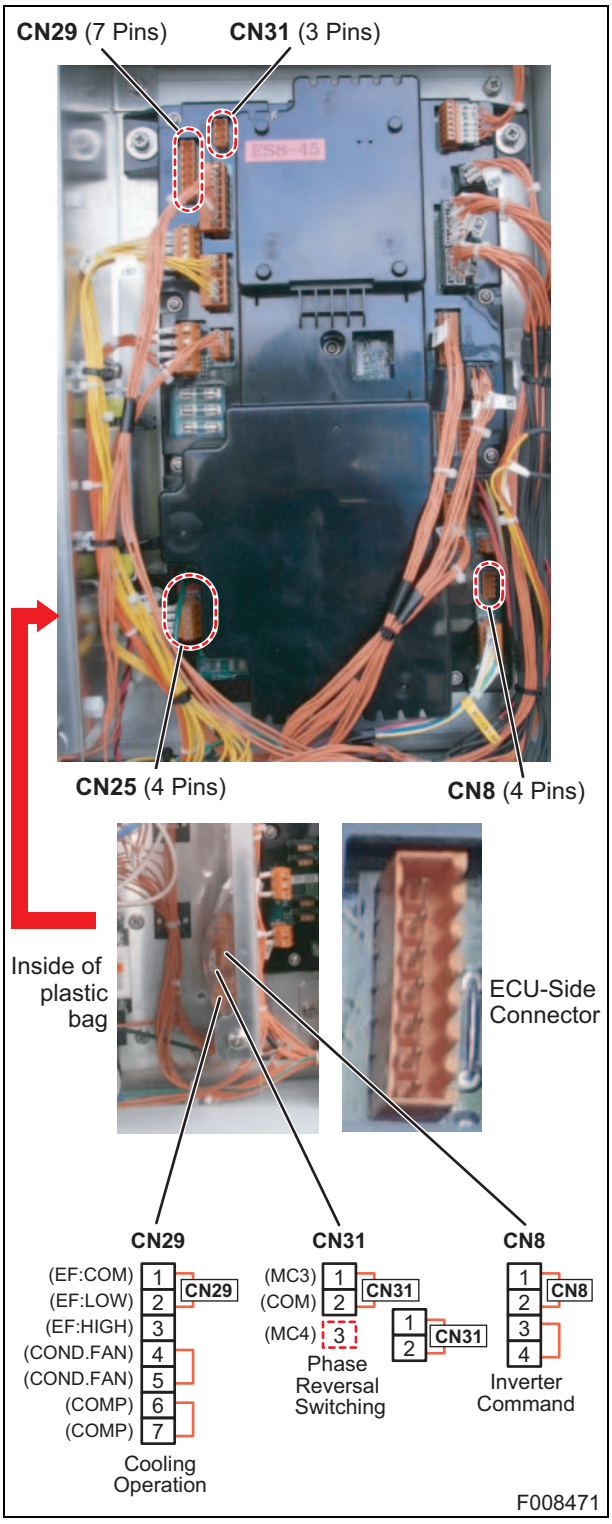




F008470

1) Remove the coil from the evaporator expansion valve and economizer expansion valve body. Disconnect the harness connector as well.
2) Turn the coil clockwise to fully close both of expansion valves.(approximately 7 turns.)
3) Turn the evaporator expansion valve counter clockwise (2 times) to open the valve. After adjustment, press the coil onto the body to fix it in place.

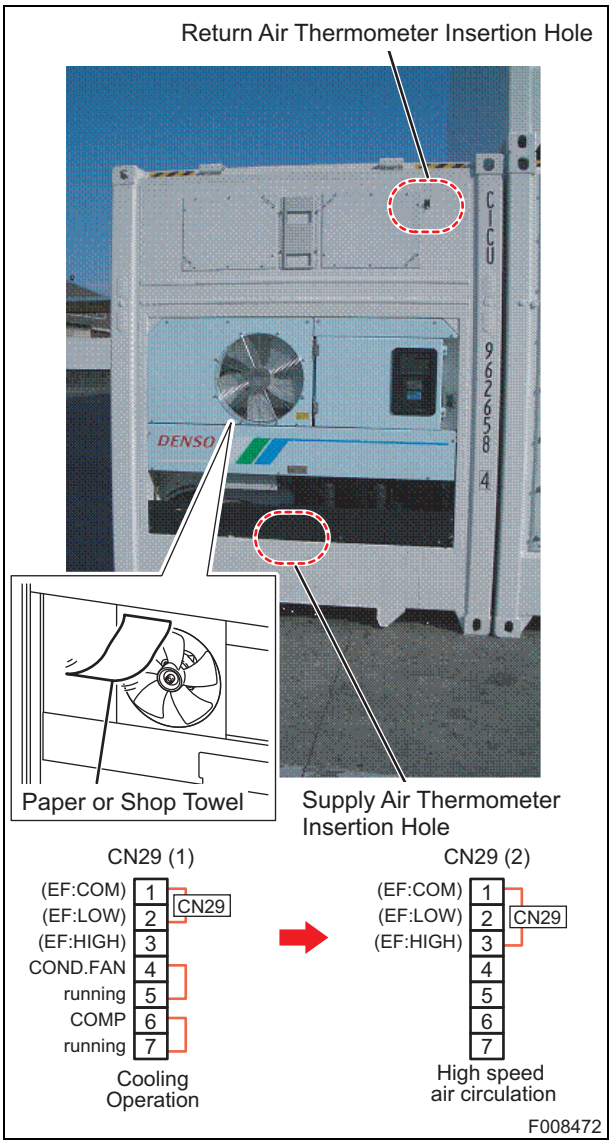
8.3 Emergency Operation Procedure (ECU-Side Preparation)



1) Disconnect the connector from ECU **CN25** (23 V power supply.)
2) Connect ECU **CN29** (cooling operation), **CN31*** (phase reversal switching), and **CN8** (inverter command) to the emergency operation bypass connector.

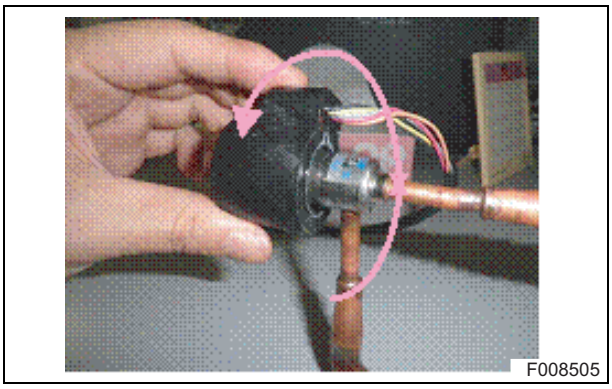
* : The ECU-side **CN31** connector is 3 pins in relation to the 2 pins on the bypass connector. The phase sequence can be switched by inserting into numbers 1 and 2, or numbers 2 and 3, thereby changing the direction that the condenser fan air flow.

8.4 Emergency Operation Procedure (Reefer Unit enforcement operation)



1) Turn the unit ON/OFF switch to the ON position, then check for the condenser airflow direction. The airflow should blow towards you and not into the unit. (for illustration, a paper or cloth hold in the front of the condenser grill should blow away towards you and not stick on the grill.) In case of wrong airflow direction, turn OFF the unit ON/OFF switch and change the jumper in CN31 from pin 1 and 2 to pin 2 and 3 or vice versa.

2) Place thermometers in to the two ports shown in left picture for Return Air-and Supply Air, Thermometer Insertion Hole. This for precise manual control however avoid entrance of outside - or loss of conditioned, air through the ports, for economic reason.

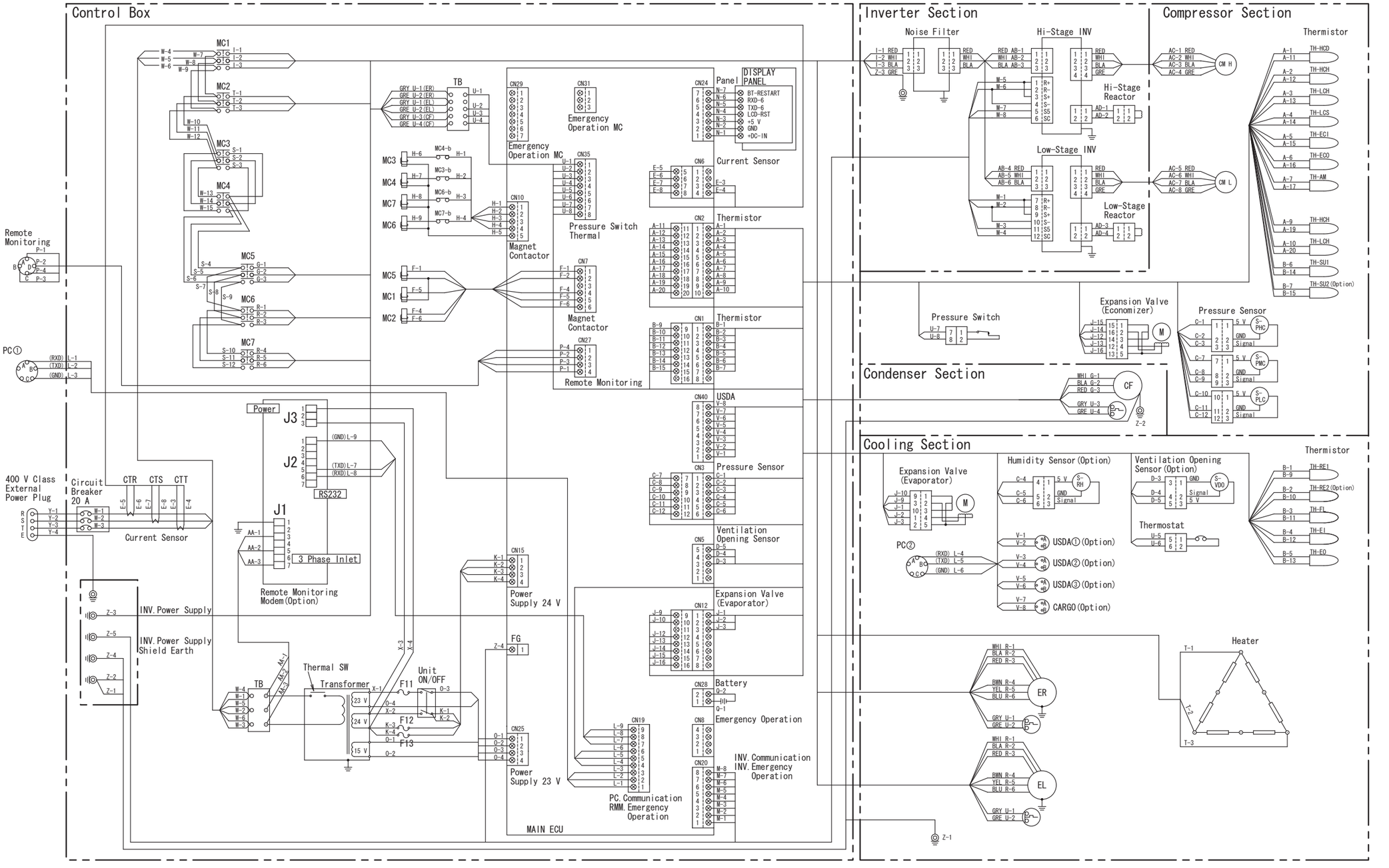


3) Check regularly for frost on the Low Stage Compressor suction pipe. In case of frost signs, close the evaporator expansion valve by rotation of the valve coil, while placed on the valve stem, by half a turn clock wise.

4) In case of extra care for chill damage to the cargo load, switch from low evaporator fan speed to high evaporator fan speed. Change on CN29 jumper between pin 1and 2 into jumper between pin 1 and 3 without cooling (no running of compressors and condenser fan motor) .

1. Wiring Diagram

1.1 Wiring Diagram



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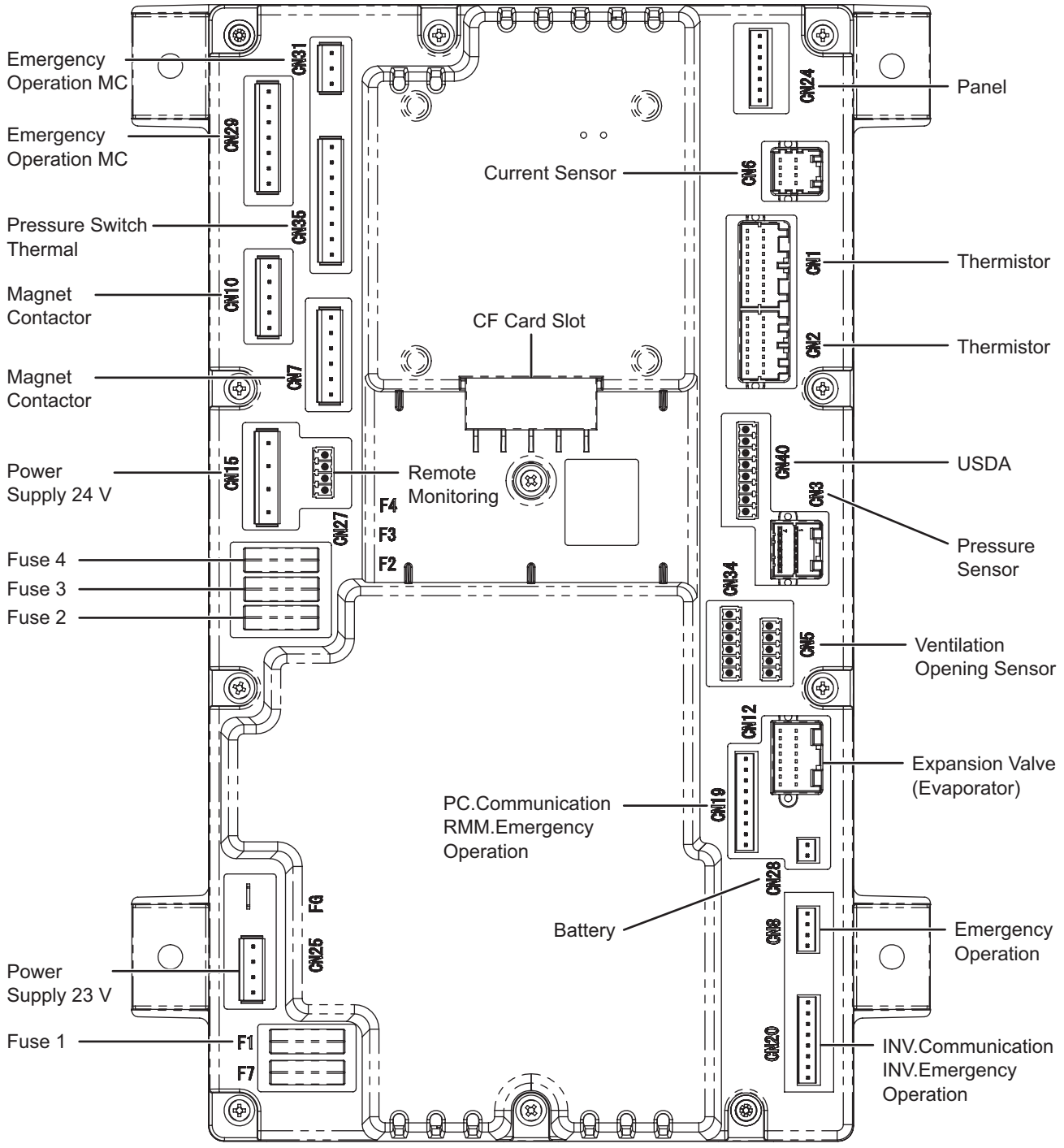
CTR	Current Sensor R	S-PLC	Low Pressure Sensor
CTS	Current Sensor S	SPH	High Pressure Switch
CTT	Current Sensor T	STHH	Heater Thermal Switch
CF	Condenser Fan Motor	TB	Terminal Block
EL	Cooling Fan Motor, Left	THAM1	Ambient Temperature Sensor 1
ER	Cooling Fan Motor, Right	THAM2	Ambient Temperature Sensor 2
CMH	High Stage Compressor	THECI	Economizer Inlet Temperature Sensor
CML	Low Stage Compressor	THECO	Economizer Outlet Temperature Sensor
MC1	Compressor Contactor	THEI	Evaporator Inlet Temperature Sensor
MC2	Heater Contactor	THEO	Evaporator Outlet Temperature Sensor
MC3	Phase Sequence Contactor	THFL	Defrost Temperature Sensor
MC4	Phase Sequence Contactor	THHCD	High Stage Compressor Discharge Temperature Sensor
MC5	Condenser Fan Contactor	THHCH	High Stage Compressor Body Temperature Sensor
MC6	Cooling Fan Hi Contactor	THLCH	Low Stage Compressor Body Temperature Sensor
MC7	Cooling Fan Lo Contactor	THLCS	Low Stage Compressor Suction Temperature Sensor
PC1	Personal Computer (PC)	THRE1	Return Air Temperature Sensor 1
PC2	Personal Computer (PC)	THRE2	Return Air Temperature Sensor 2 (Optional)
S-PHC	High Pressure Sensor	THSU1	Supply Air Temperature Sensor 1
S-PMC	Middle Pressure Sensor	THSU2	Supply Air Temperature Sensor 2 (Optional)

1. Connector Layout Diagram

1.1 ECU Connector Layout Diagram



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